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"Education through self-help is our motto"-Karmaueer



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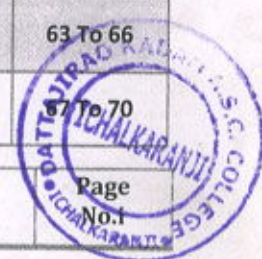
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### वैश्वीकरण की भाषा हिंदी

डॉ. दीपक रामा तुपे

स्नातक तथा स्नातकोत्तर हिंदी विभाग,

दत्ताजीराव कदम आर्ट्स, साइंस एंड कॉमर्स कॉलेज, इचलकरंजी

भूमंडल हिंदी का पुराना शब्द है। अंग्रेजी के 'ग्लोबलाइजेशन' शब्द का हिंदी अनुवाद 'भूमंडलीकरण' शब्द कुछ ही साल पहले प्रचलन में आया। आज ग्लोबल होती हिंदी की चर्चा सर्वदूर हो रही है, जो किताबी भाषा से बाहर निकलकर आम बोलचाल का रूप ग्रहण कर चुकी है। स्थानीय, क्षेत्रीय वस्तुओं या घटनाओं को वैश्विक पटल पर प्रस्तुत करने की प्रक्रिया है-वैश्वीकरण। वैश्वीकरण का प्रभाव आज आर्थिक, सामाजिक, तकनीकी, राजनीति, बाजार, भाषा, लिपि आदि क्षेत्रों में दिखाई देता है। वर्तमान संदर्भ में भूमंडलीकरण का अर्थ व्यापक तौर पर बाजारीकरण, निजीकरण, उदारीकरण, विकेंद्रीकरण है। अमरेश द्रविदेदी अपने 'ग्लोबल गांव में हिंदी' आलेख में लिखते हैं- 'भूमंडलीकरण की जो सैद्धांतिक है वो एकरूपता के पक्ष में जाती है। वो मानती है कि अगर एक भाषा होगी तो भूमंडलीकरण के विस्तार में मददगार साबित होगी।'

मनुष्य समस्त प्राणियों में सर्वश्रेष्ठ है क्योंकि उसके पास मस्तिष्क है। इस मस्तिष्क में विचारों की प्रक्रिया होती है। इन विचारों की अभिव्यक्ति के लिए माध्यमों की आवश्यकता होती है। वैसे देखा जाए तो मौन भी मुखर माध्यम होता है, किंतु अभिव्यक्ति के स्तर पर भाषा ही वह माध्यम है, जिससे विचार, भाव और अनुभव-मूर्त रूप धारण करते हैं। इतना ही नहीं, भाषा व्यक्ति की पीड़ा, उल्लास और संवेदनाओं की अभिव्यक्ति का सशक्त माध्यम है। भाषा वैचारिक और व्यक्ति के मानस पटल पर उद्बलित भावनाओं का प्रतिबिंब है। आज विश्व में अनेक भाषाएँ बोली जाती हैं। शायद सभी भाषाएँ संवेदना के स्तर पर आपसी जुड़ाव रखती हैं, लेकिन हिंदी भाषा अपनी लचीलेपन और सहजता की वजह से इस संवेदनशीलता के अत्यंत निकट है। हिंदी शब्द भारतीयता और भारत के संबंध का द्योतक था, जो कि अभारतीयों के द्वारा प्रयुक्त किया जाता था; जो लोग भारत में आए हैं वे भारतीय हैं और उनकी बोली को हिंदवी कहा जाता था। तदोपरान्त हिंदवी शब्द हिंदी प्रदेश की बोलियों और उपभाषाओं के लिए प्रयुक्त होने लगा था। हिंदी भाषा का इतिहास हजारों सालों पुराना है। हिंदी भाषा गतिशील नदी की तरह निरंतर कठिनता से सरलता की ओर बहती है। उसकी प्रक्रिया के संदर्भ में साहित्यकार राजेंद्र यादव का कहना है कि- 'भाषा कभी बनती, बिगड़ती या बदलती नहीं बल्कि विकसित होती है।'

आज जिस समृद्ध, संपन्न हिंदी का बोलबाला है उसके विकास की अपनी एक कहानी है। शैशवावस्था में हिंदी अपभ्रंश के निकट रही। 1000 से 1100 ई. तक हिंदी का ऐसा ही मिलाजुला रूप रहा। हिंदी का व्याकरण भी अपभ्रंश के अनुरूप था। परिवर्तन के कई पाड़ाव पार कर अवधी और ब्रज के सांनिध्य में रही हिंदी की 1500 ई. तक स्वतंत्र पहचान बन चुकी थी। हिंदी का मध्यकाल (1500-1800) आक्रमणकारियों का काल रहा। इसी कारण हिंदी में विदेशी आक्रमणकारियों की भाषा के शब्द आए। इसमें तुर्की, फारसी शब्दों का समावेश हुआ। व्यापार के कारण देश का संपर्क बढ़ने लगा और पुर्तगाली, स्पेनी, फ्रांसीसी और अंग्रेजी भाषा के शब्दों का प्रवेश हिंदी भाषा में हुआ। इस दौरान पिंगल, मैथिली, ब्रजभाषा और खड़ीबोली में भी साहित्य सृजन हुआ। मुगल काल में उर्दू के शब्द हिंदी भाषा में रच-बस गए। भारत जैसे विविधतापूर्ण देश में हिंदी की महत्वपूर्ण भूमिका रही है। हिंदी भाषा वह भाषा है जिसने पराधीनता के काल में आजादी की अलख जगाने अर्थात् सेतु के रूप में कार्य किया। आजादी प्राप्ति के बाद अंग्रेजों की बनी बनाई व्यवस्था में अंग्रेजी की प्रधानता और अभिजात्य वर्ग में अंग्रेजी का बोलबाला होने के कारण 22 बोलियों से युक्त हिंदी भाषा को राजभाषा का दर्जा दिया गया।

वैश्वीकरण का असर वर्तमान हिंदी साहित्य पर ही नहीं बल्कि हिंदी उपन्यासों पर भी दिखाई देता है। हिंदी उपन्यास के शीर्षक पर भी वैश्वीकरण का असर दिखाई देता है। जैसे-उपन्यास साहित्य-नीत्रेश रघुवंशी का 'एक कस्बे के नोट्स' (2012), शशिकांत मिश्र का 'नॉन रजिडेंट बिहारी' (2015), विनोद भारतदवाज का 'सेप्पुक' (2015), अलका सरावगी का 'जानकीदास तेजपाल मैनसेन' (2015), सुधीश पचौरी का 'मिसकारु: एक लव स्टोरी' (2017); नाट्य साहित्य-हेनरिक इब्सन का 'मास्टर बिल्डर'; कविता संग्रह-राजकमल चौधरी का 'ऑडिट रिपोर्ट' आदि। इन शीर्षकों पर गौर करने पर पता चलता है कि अंग्रेजी भाषा का प्रभाव हिंदी साहित्य पर दिखाई देता है, जिसके कारण उपन्यास, नाटक एवं कविता संग्रहों के शीर्षक हिंग्रेजी बनते जा रहे हैं। इस संदर्भ में हिंदी की सुप्रसिद्ध लेखिका अलका सरावगी के मतानुसार- 'यह सच है कि अंग्रेजी का वर्चस्व बढ़ता जा रहा है। लेकिन साथ ही भाषा के स्तर पर एक नई शब्दावली का भी गठन हो रहा है; जो आज के जीवन यथार्थ को पकड़ने में मददगार हो रही है और इस तरह हिंदी एक समृद्ध भाषा बन रही है।'<sup>2</sup> आज हिंदी मातृभाषा, संपर्क भाषा, राजभाषा, जनभाषा जैसे विभिन्न रूपों में उभर रही है। वर्तमान समय में बहुभाषिक देश को एकता के सूत्र में पिरोने का कार्य हिंदी भाषा पूरे सिद्ध के साथ कर रही है।





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प्रिंट माध्यमों की भाषा जहाँ एक ओर सरल, स्पष्ट, सहज, सूचनात्मक, संप्रेषणीय और मानक नजर आती है तो दूसरी ओर वैश्विक स्तर पर हिंग्लिश बनती हुई दिखाई देती है। चर्चित समाचार पत्र दैनिक 'भास्कर' में प्रकाशित समाचार के शीर्षक यहाँ द्रष्टव्य है—'सीलिंग की धीमी रफ्तार से कमेटी नाराज', 'मेट्रो कमर्शियल और रेजिडेंशियल प्रोजेक्ट अटके', 'नो मेकअप सेल्फीज से भी चलता है कॉन्ट्रिब्यूटर्स का जादू', 'वैटिलेशन का अभाव', 'ट्रेन लेट है', 'मोबाइल का बढ़ता क्रेज' आदि। इन शीर्षकों से विदित होता है कि समाचार पत्रों की भाषा में अंग्रेजी का प्रभाव दिखाई देता है। इतना ही नहीं, विभिन्न पत्र-पत्रिकाएँ, पाक्षिक, मासिक, द्वैमासिक, त्रैमासिक, अर्धवार्षिकी, वार्षिकी, द्वैवार्षिकी, त्रैवार्षिकी, विशेषांक, ग्रंथ, संदर्भ ग्रंथों की भाषा दिन-ब-दिन बदलती जा रही है। प्रिंट माध्यमों पर अंग्रेजी भाषा का प्रभाव कुछ ज्यादा ही नजर आ रहा है, जिसके कारण इन माध्यमों की भाषा हिंग्लिश बनती जा रही है।

इलेक्ट्रॉनिक माध्यमों की भाषा पर भी वैश्वीकरण का असर दिखाई देता है। रेडियो, दूरदर्शन और फिल्म की भाषा में परिवर्तन नजर आ रहा है। रेडियो की भाषा इन दिनों संप्रेषणीय, सूचनापरक, जनप्रचलित, सहज, सरल, रोचक, आकर्षक, सुबोध, मुहावरे और कहावतों से युक्त दिखाई देती है। इसके अलावा अंग्रेजी तथा अन्य भाषाओं के शब्दों का आगमन भी रेडियो की भाषा में दिखाई देता है। दूरदर्शन एवं विभिन्न चैनलों की भाषा हिंग्लिश, खिचड़ी, नाटकीय, चित्रात्मक, दृश्यात्मक, आम बोलचाल की, स्पष्ट, सरल, सर्वसहज, आकर्षक, प्रभावी और लोकअभिरुचि के अनुरूप होती है। फिल्मों की भाषा भावपूर्ण बिंबों-प्रतिबिंबों एवं संकेतों की भाषा होती है। ध्वनि के साथ संगीत तथा संकेतों का प्रयोग फिल्मी भाषा में दिखाई देता है। हिंदी फिल्मों की भाषा चित्रात्मक, जनभाषा, स्पष्टता, आवाज में आरोह-अवरोह, स्वरों का उतार-चढ़ाव से युक्त दिखाई देती है। आज फिल्मों में हिंग्लिश शब्दों का प्रयोग अधिकांश मात्रा में नजर आ रहा है। यहाँ हिंदी फिल्मों के शीर्षकों के उदाहरण द्रष्टव्य हैं; जैसे—'स्लमडॉग मिलेनर', 'टॉयलेट एक प्रेम कहानी', 'मिस्टर इंडिया', 'श्री इंडिया', 'सन ऑफ इंडिया', 'गैलमबर', 'मदर इंडिया', 'ब्लैक कैट' आदि। ये फिल्म हिंदी तो हैं, मगर शीर्षक हिंग्रेजी में दिए हुए हैं; जो वर्तमान समय की जनप्रचलित भाषा है। गीतों की भाषा एक ओर मानक तो दूसरी ओर हिंग्लिश नजर आ रही है। जैसे—'बन टू का फोर, फोर टू का बन माय नेम इज लखन ...', 'विश्वबंधुत्व का नारा है सारे जहाँ के हैं हम, सारा जहाँ हमारा विश्व बंधुत्व का यह है नारा, विश्व है परिवार भारत घर हमारा है।' इसमें पहले गीत की भाषा हिंग्रेजी और दूसरे गीत की भाषा मानक एवं जनप्रचलित दिखाई देती है।

वेब माध्यमों अर्थात् अंतरजाल की भाषा समय के साथ कदमताल करती है। हिंदी भाषा का बदलता रूप आज अंतरजाल पर नजर आ रहा है। जालस्थल की भाषा मानक दिखाई देती है; जैसे—'वसुधैव कुटुंबकम्' के संकल्प को आगे बढ़ता भारत: प्रधानमंत्री नरेंद्र मोदी, 'वैश्विक व्यापार में भारत का योगदान', 'नैतिक मूल्य मानवता की पहचान होते हैं।' जालस्थल पर प्रकाशित में ये शीर्षक जनप्रचलित खड़ीबोली हिंदी में हैं। जालस्थल की भाषा का बदलता रूप इस प्रकार है—'बॉक पर नेर कैलोरी का भी हिसाब', 'बदला मेंस वॉर्डरोब का अंदाज', 'ई-वे बिल ने पहले ही दिन जाम किए ट्रकों के पहिए'। जालस्थल की भाषा हिंग्लिश बनती जा रही है। सोशल मीडिया पर भी हिंदी का प्रभाव दिनोंदिन बढ़ता जा रहा है। लेकिन वहाँ तो वाक्य हिंदी में पुकारा जाता है और लिखा रोमन लिपि में जाता है।

मीडिया और विज्ञापनों में हिंदी भाषा का प्रयोग ज्यादा मात्रा में परिलक्षित हो रहा है। विज्ञापन की भाषा जनप्रचलित, आकर्षक, विश्वसनीय, स्मरणीय, पठनीय, प्रभावोत्पादक, सहज, सरल और बोधगम्य नजर आती है। जैसे—'दिल नहीं बिल छोटा कीजिए', 'जिंदगी के साथ भी, जिंदगी के बाद भी', 'दिल मांगे मोर रे', 'ठंडा मतलब कोका कोला', 'शान की सवारी हीरो होडा', 'पति घर पर पत्नी छुट्टी पर बाईफ बिना लाइफ', 'प्राकृतिक कोमलता से गोरा बनाए कि सभी देखते रह जाएं', 'कोई भी ब्रांड इतने फीचर्स नहीं दे सकता और वो भी इस अविश्वसनीय कीमत पर' आदि।

विज्ञान एवं प्रौद्योगिकी की भाषा में बदलाव नजर आ रहा है। जैसे एटीएम (स्वंचालित निकासी यंत्र), तकनीकी (प्रौद्योगिकी), इंटरनेट (अंतरजाल), वेबसाइट (जालस्थल), कम्प्यूटर (संगणक), ब्लॉग (चिट्ठा) आदि। विज्ञान एवं प्रौद्योगिकी की भाषा में अंग्रेजी शब्दों की भरमार नजर आती है। मौखिक भाषा से शुरू हुई परंपरा लिखित से होते हुए फोनेटिक लैंग्वेज तक पहुँच गई है। हाल ही में संगणक कोड मिक्सिंग भाषा भी समझने लगा है अर्थात् संगणक हिंदी और अंग्रेजी दोनों एक साथ लिपिबद्ध करने लगा है। इसमें जबलपुर की छात्रा आयुषी पांडे ने जॉन हॉपकिंस यूनिवर्सिटी, अमेरिका में "फोनेटिकली बैलेंस्ड कोड मिक्सड हिंदी-इंग्लिश रीड स्पीच कोर्पस फॉर ऑटोमेटिक स्पीच रिकग्नेशनम" नाम से शोध कार्य किया है; जिसके तहत हिंदी और अंग्रेजी भाषा का उच्चारण एक साथ लिपिबद्ध होगा। वैश्वीकरण के युग में हिंदी जनप्रचलित भाषा होगी।

वैश्वीकरण के प्रभाव स्वरूप और सूचना प्रौद्योगिकी के युग में हिंदी सॉफ्टवेयर की भाषा बन गई है। देश-विदेश की भाषाओं के तमाम शब्द हिंदी भाषा में घुल-मिल चुके हैं। वे अन्यान्य भाषाओं के होने के बावजूद दूसरी भाषा के नहीं लगते। वैश्वीकरण के कारण हिंदी भाषा गाँव के हाट तक पहुँच चुकी है। फिल्मों के बढ़ते प्रभाव के कारण हिंदी का प्रचार-प्रसार देश-विदेश में हो चुका है। डॉ. जयंतीप्रसाद नौटियाल ने वर्ष 2012 में किए गए भाषा शोध अनुसंधान रिपोर्ट के तहत आज दुनिया में सबसे ज्यादा बोली और समझी जाने वाली भाषा हिंदी है। चीनी न्यूज एजेंसी

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सिन्हुआ की रिपोर्ट के अनुसार केवल 70 फीसदी चीनी ही मंदारिन बोलते हैं, जबकि भारत में हिंदी बोलने वालों की संख्या 78 फीसदी है। डॉ. नौटियाल ने लिपि के आधार पर भाषा का अध्ययन किया और हिंदी भाषा की देवनागरी लिपि ने चीनी भाषा की मंदारिन लिपि को पीछे छोड़कर विश्व में अबल स्थान पा लिया है।

**निष्कर्षत :**

कहा जा सकता है कि सूचना प्रौद्योगिकी के कारण विश्व सीमट रहा है, जिसका सीधा असर हमारी भाषा पर हो रहा है। इस दौर में देश बदल रहा है और समय बदल रहा है। ऐसे परिवर्तकारी युग में अगर हिंदी भाषा बदल रही है तो इसमें परेशान होने वाली कोई बात नहीं है, जबकि खुश होना चाहिए। भाषा की फितरत ही है बदल जाना। बदलाव न हो तो पानी भी सड़ांध मारता है और बदबूदार पानी किसी भी काम का नहीं रहता। इसलिए भाषा को भी जिंदा रहने के लिए समय के साथ बदलना होगा। जब तक भाषा नहीं बदलेगी तब तक विकास असंभव है। विभिन्न भाषा-भाषियों के बीच हिंदी संवाद-सेतु का कार्य करती है। वैश्वीकरण के इस दौर में भारतीय बाजार की ताकत जैसे-जैसे बढ़ेगी वैसे-वैसे हिंदी भाषा की ताकत बढ़ेगी। देश-विदेश की करोड़ों जनता तक हिंदी भाषा ने अपनी पहुँच बनाई है क्योंकि हिंदी सूचनापरक एवं संप्रेषणीय भाषा है। रही बात हिंदी भाषा के हिंग्लिश रूप की, इसमें ध्वनि, शब्द, पद, वाक्य, अर्थ के साथ-साथ उच्चारण, बर्तनी, लिपि एवं व्याकरण का मानकीकरण होगा तो आने वाले समय में यह समस्या भी हल होगी; इसमें कोई संदेह नहीं।

**संदर्भ संकेत:**

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डॉ. दीपक रामा तुपे

सहायक प्राध्यापक, हिंदी विभाग,  
दत्ताजीराव कदम आर्ट्स, साइन्स एंड कॉमर्स,  
इचलकरंजी-४१६११५.

आज का युग सूचना प्रौद्योगिकी का युग है। जहाँ पर उदारीकरण, निजीकरण, भूमंडलीकरण की हवा बह रही है। इनमें भूमंडलीकरण की हवा पूरी सक्रियता के साथ समग्र विश्व में विस्तारित हो रही है। इसी भूमंडलीकरण के कारण आज पूरा विश्व वैश्विक ग्राम में तब्दील हो गया है। भूमंडलीकरण के कारण हम एक-दूसरे के करीब तो आ चुके हैं, लेकिन सामाजिक, राजनीतिक, सांस्कृतिक, शैक्षिक जैसे क्षेत्र एक-दूसरे से अपरिचित हो रहे हैं। इसी परिचय की वजह से हमारा साहित्यकार भी भूमंडलीकरण के प्रभाव से प्रभावित है। हमारा समाज अन्यान्य समस्याओं से ग्रस्त है। हमारी संस्कृति पर देश-विदेश की संस्कृतियों का असर हो रहा है, जिसके कारण हमारी संस्कृतिक धरोहर बचाए रखना एक चुनौती बन गई है। अलका सरावगी लिखित 'जानकीदास तेजपाल मैशन' प्रकाशन क्रम के अनुसार पाँचवाँ उपन्यास है, जो राजकमल प्रकाशन, नई दिल्ली द्वारा सन् २०१५ ई. में प्रकाशित हो चुका है। प्रस्तुत उपन्यास भूमंडलीकरण से उत्पन्न विभिन्न समस्याओं को हमारे सम्मुख रखता है और देश पर आने वाले खतरों के प्रति सजग करता है। इस उपन्यास की कथा कलकत्ता के सेंट्रल ऐवन्यू स्थित 'जानकीदास तेजपाल मैशन' नाम की अस्सी परिवारों की एक खड़ी इमारत के इर्द-गिर्द घूमती है। प्रस्तुत उपन्यास का नायक जयगोविंद सन् १९७० ई. के दशक में कोलकाता के जादवपुर विश्वविद्यालय से इंजीनियरिंग की पढ़ाई पूरी करता है और पिताजी एडवोकेट बाबू उन्हें अमेरिका के मिशिगन स्टेट यूनिवर्सिटी से कम्प्यूटर इंजीनियरिंग की मास्टर डिग्री करने भेजते हैं। बेटे जयगोविंद को अमेरिका

भेजने के लिए माँ का विरोधी है, लेकिन पिता के आग्रह से वह अमेरिका में कम्प्यूटर की मास्टर डिग्री करता है। अमेरिका में सात साल बिताकर जयगोविंद कोलकाता लौट आता है और वह न इधर का रहता है और न उधर का। जयदीप हिंद मोटर कंपनी में नौकरी जरूर प्राप्त करता है, मगर टिक नहीं पाता। इस कदर एडवोकेट बाबू और माँ का दिल टूट जाता है। उसके बाद स्टील ट्रेडिंग कंपनी शुरू करता है, मगर उन दिनों स्टील खरीदना और बेचना गैरकानूनी था। परिणामस्वरूप उसे जेल जाना पड़ता है। जेल का मामला रफा-दफा करने के बाद वह व्यासजी की मदद से वह राजारामबाबू का ए. डी. सी. बनकर रह जाता है यानी राष्ट्रपति के पीछे खड़ा रहने वाले सुदर्शन या रोबोटनुमा चौकन्ना व्यक्ति की तरह। राजाराम बाबू का हर काम वह करता रहता है। दिल्ली मंत्रालय सहित हर जगह वह अपनी पहुँच बना देता है। राजाराम बाबू से छुटकारा पाने के बाद उसका दोस्त प्रीतम भन्साली का कोलकत्ते स्थित बेहाला की जमीन खाली करने का काम उसके पास आता है। बेहाला के सबसे बड़े मस्तान दिवाकर घोष की मदद से बेहाला की जमीन लगभग खाली कर कई लोगों को बेघर बना देता है, मगर एक बुढ़िया वहाँ से जाने के लिए तैयार नहीं होती। उस बुढ़िया के पास दूर का भतीजा रहता था। दिवाकर ने भतीजे की मदद से नींद की गोली खिलाकर उसे इस दुनिया से बेघर कर दिया। इधर आफताब हुसैन ने कॉरपोरेशन के चीफ इंजीनियर की सिफारिश पर जानकीदास तेजपाल मैशन को गिरा दिया और जयदीप को बेघर कर दिया। अपने को बेदखल किए जाने



की पीड़ा दूसरों को बेदखल करने में आड़े नहीं आती। “इधर बुढ़िया भागी, इधर जयदीप। एक ही रात में दोनों बेघर हो गए थे। ...बेदखल होना और बेदखल करना एक साथ होते ही हैं। यह तो जीवन का शाश्वत सत्य है।”<sup>1</sup> संयोग की बात यह है कि किसी को बेदखल करना या बेदखल होना एक ही सिक्के दो पहलू हैं। लेखिका अलका सरावगी ने जयदीप के माध्यम से जीवन के इस शाश्वत सत्य उजागर कर दिया है।

आधे उपन्यास में वह अपना जीवन जयदीप के रूप में जीता है और आधे उपन्यास में बड़े बाजार को नेशन स्टेट से रीयल इस्टेट बनाने की यथार्थता में जीता है। ‘विडंबना यह नहीं है कि जयगोविंद का जीवन जयदीप से असम्पृक्त है बल्कि दोनों को अलग करना मुश्किल है और टेढ़ी खीर भी।’ फर्क यह है कि वास्तविक आत्मकथा लिखने के प्रयास में वह बार-बार अपने आपको बचाने की कोशिश करता है, जो अपने ही लिखे को सही नहीं मानता। इस क्रम में आजादी के बाद इस देश की जवान पहली पीढ़ी को मिले धोखे और नाकामयाबी सिस्टम की दास्तान अमेरिका के वियतनाम-युद्ध से लेकर विकीलीक्स के धोखे तक फैली है। जयगोविंद के नए. आर. आई. मित्र हैं, जो इंफेक्शन के डर से इंडिया नहीं आते और वह लौटने के लिए तड़पता रहता है। जयदीप का बेटा रोहित, जो विदेश में पढ़कर आया है वह इंडिया को चिड़ियाघर कहता है। इस चिड़ियाघर के कोलकाता शहर में जानकीदास तेजपाल मैनशन नामक इमारत की वास्तविकता मेट्रो की सुरंग लगाने से ढहने और ढहाए जाने में है। इस इमारत को बचाने के लिए जयगोविंद जी-जान से प्रयास करता है। इसके लिए वह मेट्रो-पीड़ित बंधु एसोसिएशन प्रेसिडेंट का अध्यक्ष भी बन जाता है। यह इमारत अपने देश का प्रतीक है। यह इमारत गुजरती बस की आवाजाही से हिलता रहता है; जिसका गिर जाना तय है। “सड़क पर गुजरती हर बस के साथ

हिलता ‘जानकीदास तेजपाल मैनशन’ एक नया अर्थ-संकेत है—पूरे देश का, जिसका ढहाया जाना तय है। राजनीति, प्रशासन, पुलिस और पूँजी के बीच बिचौलियों का तंत्र सबसे कमजोर को सबसे पहले बेदखल करने में लगा हुआ है।”<sup>2</sup> स्पष्ट है कि आज राजनीति, प्रशासन, पुलिस और पूँजीपति ‘जानकीदास तेजपाल मैनशन’ की तरह देश को ढहाने में तुले हुए हैं, जिसे बचाना एक चुनौती बन गई है, लेखिका अलका सरावगी देशवासियों से इसी चुनौती से अवगत कराना चाहती है। उपन्यास सिर्फ विस्थापन की समस्या ही नहीं बल्कि अंडरवर्ल्ड गैरकानूनी ढंग से धन कमाने, सौदेबाजी, जुगाड़ की दुनिया, नेशन स्टेट, रीयल इस्टेट, नाकाम सिस्टम की दास्तान, अमेरिका के वियतनाम-युद्ध से लेकर विकीलीक्स के धोखे तक कई भूमंडलीय मसले हैं, जो पाठक सोचने के लिए मजबूर कर देते हैं। राजनीति, प्रशासन, पुलिस, नक्सली और पूँजी के बीच के बिचौलियों का तंत्र सबसे कमजोर लोगों को जानकीदास तेजपाल मैनशन से अर्थात् देश से पहले बेदखल करने में तुले हुए हैं। लेकिन नायक जयदीप उसे बचाना चाहता है। यहाँ के अंडरवर्ल्ड गैरकानूनी ढंग से धन हड़पने, सौदेबाजी और जुगाड़ की दुनिया से पैसे ऐंठकर देश को ढहाने में लगे हुए हैं। इस दुनिया के कई पात्र हमारे जाने हुए हैं, लेकिन हम नहीं जानते कि वे किस हद तक हमारे जीवन को चलाते हैं और कब हमें अपने में शामिल कर लेते हैं। दूसरा शाश्वत सत्य यह भी है कि “क्या दिया है आजादी ने? क्या दिया नेहरू की सड़ी हुई योजनाओं ने? आजादी के पास खाने के लिए भरपेट रोटी नहीं है और ये लोग लोकतंत्र का बाजा बजाकर हमें गूँगा-बहरा रखना चाहते हैं। जब पब्लिक अनाज की दुकानों पर हमला करके उन्हें लूटेगी, तो ये लोग उसे बंदूक की गोली खिलाएंगे। उसके लिए इनके पास पैसे हैं। गोली के लिए पैसे नहीं...”<sup>3</sup> स्पष्ट है कि हमारी आजादी के पास खाने के लिए भरपेट रोटी नहीं है, गोली के लिए पैसे नहीं हैं।



मगर लोकतंत्र के नाम पर बंदूक की गोली खिलाई जाती है। यही भूमंडलीय शाश्वत सत्य है।

इस दौरान उपन्यास में जयदीप की माँ तिरबेनीबाई, एडवोकेट बाबू, पत्नी दीपा, बेटा रहित और सुमित, प्रेमिका मिशेल, हर्षद मेहता, समर शुक्ला, रमेश खेतान, गोवर्धन दास, राधेश्यामबाबू उर्फ राजारामबाबू, मिंटू चौधरी, समरेंद्र किल्ला उर्फ सैमकी, ज्योतिर्मय गुप्ता, जयंत भाई, नक्सली नेता देवनाथ मुखर्जी, जतींद्र मोहन, नेताजी सुभाषचंद्र बोस के विचारों का अनुयायी शांतनु बैनर्जी, ऊषा अथर उफ ऊषा उत्थुप, मजदूर नेता अशोक तिवारी, राजीव मिश्रा, दीपकर सेन, प्रीतम भंसाली, सिनियर बिडला, आर. एन. मुखर्जी, असीम चटर्जी, शेखर रतन, जादवपुर विश्वविद्यालय के कुलपति गोपाल सेन, अफताब हुसैन, राजू बंसल, विमल कोठारी, प्रियरंजनदास मुंशी, दरबान तिवारी, विजय जैन, सुमेधा बने, बालानंद पंडित, व्यास आदि पात्रों की छोटी-छोटी कथाओं के माध्यम से भूमंडलीय मुद्दों को उठाकर उपन्यास को गति देने में सफल रहें हैं। उपन्यास की भाषा पात्रानुकूल एवं प्रसंगानुकूल है। संवाद बहुत ही कम और संक्षिप्त है। आजादी की पूर्व स्थिति और आजादी के बाद का काल का माहौल प्रस्तुत में अंकित है। भाषा सीधी, सरल, सरस है, लेकिन बंगाली के प्रभाव से प्रभावित भी है। साथ ही भाषा में अंग्रेजी शब्दों की भरमार दिखाई देती है जो भूमंडलीकरण का ही प्रभाव मानना होगा। उपन्यास का शीर्षक 'जानकीदास तेजपाल मैनशन' समर्पक है। जिस तरह जानकीदास तेजपाल मैनशन गिरने की स्थिति में है, उसी प्रकार अपने देश का सुनहरा भविष्य भी विनाश की कगार पर है, जो बिलकुल टूटते सपनों का कड़ुआ सच है। लेखिका प्रस्तुत उपन्यास के माध्यम से विनाश की ओर जा रहे देश को बचाने का संकेत देती है। जानकीदास तेजपाल मैनशन के माध्यम से हमारे पुराने मूल्य ध्वस्त होते जा रहे हैं।

निष्कर्षतः कहा जा सकता है कि भूमंडलीकरण के प्रभाव में हमारे पुराने मूल्य, साहित्य, संस्कृति, हमारी धरोहर बचाने की बहुत बड़ी चुनौती है। आज हमारे देश की राजनीति, प्रशासन, पुलिस व्यवस्था, नक्सली और पूंजीपति, आतंकवादी, बिचौलिए हमारा लोकतंत्र, जानकीदास तेजपाल मैनशन से अर्थात् देश से बेदखल करने में तुले हुए हैं। जानकीदास तेजपाल मैनशन हमारे देश का प्रतीक है। यह घर यानी हमारा देश है और यह घर जिन समस्याओं से जूझ रहा है उन्हीं समस्याओं से आज हमारा भारत देश जूझ रहा है। इसी कारण जानकीदास तेजपाल मैनशन का भविष्य खतरे में पड़ा हुआ है यानी देश का भविष्य खतरे में पड़ा हुआ है। अंडरवर्ल्ड गैरकानूनी ढंग से धन हड़पने, सौदेबाजी और जुगाड़ की दुनिया से पैसे ऐंठकर देश को ढहाने में लगे हुए हैं। इस दुनिया के कई पात्र हमारे जाने हुए हैं, लेकिन हम नहीं जानते कि वे किस हद तक हमारे जीवन को चलाते हैं और कब हमें अपने में शामिल कर लेते हैं। आज भूमंडलीकरण के कारण उत्पन्न समस्याओं के चलते हमारी संस्कृति खतरे में पड़ गई है। सांस्कृतिक धरोहर बचाए रखने के लिए हमारे साहित्य में न्याय, समता, बंधुता जैसे मानवीय मूल्य का संवहन होना जरूरी है।

संदर्भ संकेतः

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## Review of Literature on Design and development of an expert system for diagnosis of Selected cardiac diseases

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### ABSTRACT

Expert System for diagnosis of Selected Cardiac Diseases will be a knowledge-based system capable of making multiple diagnoses for Selected Cardiac Diseases. Expert System for diagnosis of Selected Cardiac Diseases will be designed as an information system as a decision support system application, which will provide assistance in the diagnosis of Cardiac disease and will demonstrate the assistance of a microcomputer-based expert system for medical diagnosis related to Selected Cardiac Diseases.

We have thought of implementing Expert System for diagnosis of some Selected Cardiac Diseases because Heart diseases are the leading cause of death today, and causing about million deaths per year in the Society. The Cardiology has estimates that there is shortage of specialists, and the worrying fact is that the majority of electrocardiograms are analyzed by general practitioners in out-of-hospital environments. By effectively and efficiently decentralizing decision-making by means of a Expert System for diagnosis of Selected Cardiac Diseases will be a solution for effective interaction between patients, general practitioners and cardiologists even will be useful to train junior doctors and will aim to achieve a satisfactory solution to Physicians and General Practitioner's needs.

### 1. Introduction

"Expert systems are an automated reasoning system that attempts to mimic the performance of the human expert and performs tasks normally handled by a human being"

Cardiology is an important medical specialty dealing with disorders of the heart where cardiologists provide diagnosis and treatment of heart failure, congenital heart defects and coronary artery disease. It comprises the study of complex types of heart diseases and procedures.

Complicacy of clinical decisions justifies utilization of information systems such as artificial intelligence to achieve

better decisions. We aimed at to review the applications of these systems in the medical domain and specially related to some selected heart diseases.

Following is a brief review of literature of expert systems presented by various researchers, and this is the study of the comparative review of the systems in the terms of number of inputs they have considered, the Research/ Design Methodology, Problem Statement, Objectives of Study, Hypothesis that was considered and Expected Outcome of their research and finally from this study we have tried to find out the Research Gaps.

### 2. Techniques used in Implementing expert system

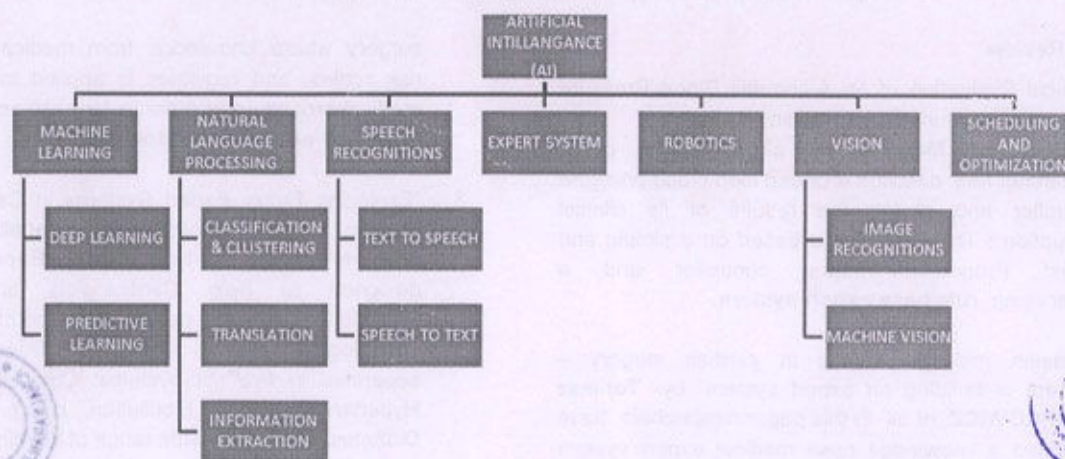


Figure1: classification of different methodologies for designing systems based on Artificial intelligence



### 3. Different Methodologies for designing an Expert System:

#### rule based, model based and frame based expert system

1. rule base expert system
2. knowledge-based expert
3. Fuzzy Expert System
4. Artificial Neural Network based expert system
5. real time based expert system
6. back-propagation artificial neural network based expert system
7. feed forward artificial neural network based expert system
8. Neuro-Fuzzy based expert system
9. Neuro-Fuzzy Hybrid based techniques
10. multilayer neural network based expert system
11. neural networks ensemble- based expert system
12. Decision Support System based expert system
13. case-based reasoning based expert system
14. ontology case-based reasoning based expert system
15. deep maxpooling convolutional neural networks based expert system
16. DeepVesselNet based expert system
17. 3-D convolutional networks based expert system
18. orthogonal cross-hair filters based expert system

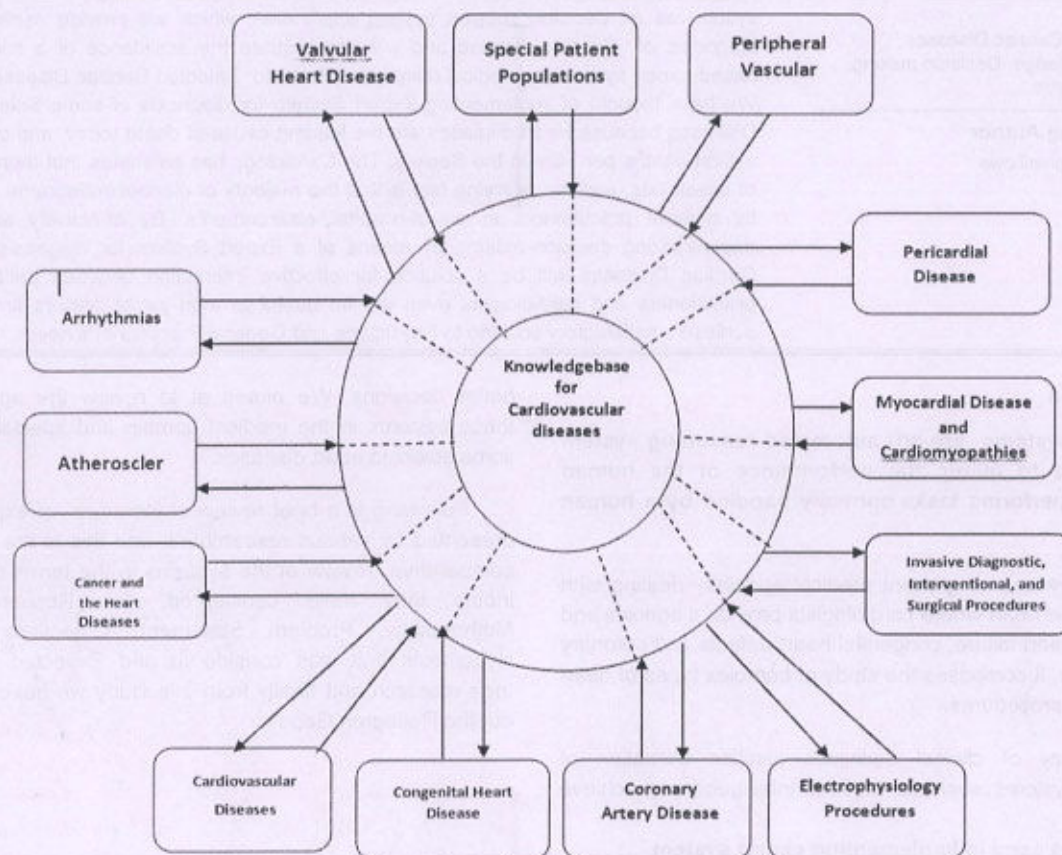


Figure2: Design of Expert system for diagnosis of Selected cardiac diseases

### 4. Literature Review

1. "Clinical Evaluation of an Automatic Blood Pressure Controller During Cardiac Surgery" by- **Roger H. A. M. Meijers**, et al- In this paper researcher has describe a closed loop blood pressure controller and shown the results of its clinical evaluation . The controller is based on a simple and robust Proportional-Integral controller and a supervising, **rule base expert system**.
2. "Decision making process in cardiac surgery – concept of building an expert system" by- **Tomasz HRAPKOWICZ**, et al- in this paper researchers have designed a knowledge base medical expert system which support the decision process making in cardiac surgery where knowledge from medical guidelines, risk scales, and registries is applied to reason the medical procedure in a particular case scenario using **rule base expert methodology**.
3. "Exploiting Fuzzy Expert Systems in Cardiology" by **Efrosini Sourla Vasileios Syrimpeis et al** - This paper presents a Sugeno-type **Fuzzy Expert System** designed to help Cardiologists and General Practitioners in taking decisions on the most common craniological clinical dilemmas. This system is separated in five sub-systems; Coronary Disease , Hypertension, Atrial Fibrillation, Heart Failure and Diabetes, covering a wide range of Cardiology.



4. "Exploiting expert systems in cardiology: a comparative study" by Vasileios Syrimpeis, et al - This paper presents a Adaptive **Neuro-Fuzzy** Inference System in the field of critical cardiovascular diseases. The system stems from an earlier application based only on a Sugeno-type Fuzzy Expert System with the addition of an **Artificial Neural Network** computational structure. Researchers have tried to , inherent characteristics of ANNs, along with the human-like knowledge representation of fuzzy systems to integrate together. The ANFIS has been utilized into building five different sub-systems, distinctly covering Coronary Disease, Hypertension, Atrial Fibrillation, Heart Failure, and Diabetes, the system aids doctors of medicine. The Fuzzy Rules have been trimmed down and the have been optimized in order to focus into each particular disease and produce results ready-to-be applied to real-world patients.
5. "Diagnosis and explanation by a nuclear cardiology expert system" by- **Kenneth M.**, et al-In this article, researcher describes a process of the designing and developing a **knowledge-based expert** system which aids interpretation of radionuclide imaging in the heart. They have designed a multimedia user interface for a diagnostic, testing facility, which help's training clinicians
6. "Expert system for phonocardiographic monitoring of heart failure patients based on wavelet analysis" by- **E. Kail.**, et al- Researchers have developed An expert system for the phonocardiographic monitoring in the coronary care unit and as well as at home. The aim of the study is to examine the performance of wavelet transformation in a heart failure group with noisy environment. For detection and interpretation of heart sounds and murmurs. Researchers have developed an expert system basically for the phonocardiographic monitoring of heart murmur noise using Fourier and the wavelet transformation for the time-frequency representation
7. "A Hybrid Expert System Supporting Diagnosis Of Heart Diseases" by-, **Abdel-Badeeh M. Salem and Rania A.** - In this paper, Researchers have developed a hybrid expert system for diagnosis of heart diseases. The system merges uncertainty management techniques and case-based reasoning. The system is able to give diagnosis for 4 heart diseases namely; mitral stenosis, left-sided heart failure, stable angina pectoris and essential hypertension with the corresponding certainty factor. The system has been implemented in visual prolog for windows and has trained set of 42 cases for Egyptian cardiac patients and has been tested by another 13 different cases. Each case contains 33 significant attributes resulted from the statistical analysis performed to 110 cases. It is a Rule-Based Expert System for Diagnosis of Heart Diseases.
8. "A Rule-Based Expert System For Automated ECG Diagnosis" by- Muzhir Shaban Al-Ani and Atiaf Ayal Rawi - This paper presents the development of a **rule-based expert system** that emulates the ECG interpretation skills of an expert cardiologist for introducing way of automating the diagnosis of cardiac disorders. In this rule-based expert system, patient's heart rate and the wave characteristics of the ECG are considered. With these 'facts', rules are framed and a rule base is developed in consultation with experts. An inference engine in the expert system uses these inputs and the rule base to identify any abnormality in the patient's heart .An expert system designed on the basis of information derived from the analysis of (ECG) using Microsoft Visual studio.Net. For this paper the shape of ECG is used to diagnose ECG beat in four types such as Normal beats (N), Sinus Bradycardia beat, Sinus Tachycardia beat and Sinus Arrhythmia beat. The ECG image from ECG simulator is processed by some image processing techniques such as red grid removing, noise rejection, and image thinning firstly, then, combining detection component of ECG signal(P,QRS,T) based on Time-series ECG are obtained.
9. "Cardiac Arrhythmia Classification Using Neural Networks with Selected Features" by- **Malay Mitra and R. K. Samanta** - This research presents an approach for cardiac arrhythmia disease classification, they have designed an intelligent automated decision support systems on the basis varying accuracies tested on UCI arrhythmia. This work attempts correlation-based feature selection with linear forward selection search. For classification, they have used incremental back propagation neural network, and **Levenberg-Marquardt classification** tested on UCI data base.
10. "Application of Artificial Neural Networks in the Heart Electrical Axis Position Conclusion Modeling" by- **L N Bakanovskaya**- This research presents an approach upon building of a heart electrical axis position conclusion model using an artificial neural network. The input signals of the neural network are the values of deflections Q, R and S; and the output signal is the value of the heart electrical axis position. Training of the network is carried out by the error propagation method.
11. "Use of Artificial Neural Networks within Deterministic Logic for Computer ECG Diagnosis of Myocardial Infarction" , by- **T.F.Yang B.Devine & P.W.Macfarlane** - The study was aimed at assessing the effect of incorporating neural networks inside an existing deterministic computer ECG analysis program in order to enhance the diagnosis of myocardial infarction. Separate **neural networks** were trained for inferior and anterior myocardial infarction using 200 normals, 100 IMI, 80 AMI and 42 left ventricular hypertrophy cases, all clinically validated. All the networks had a single output to discriminate between



- MI and non-MI. A variable number of inputs to the networks was used consisting of QRS  $\pm$  ST-T measurements. Separate test sets including 200 normals, 42 LVH, 101 AMI and 80 IMI cases were then utilised to find the best performing neural networks for IMI and AMI.
12. "Fuzzy expert system for cardiovascular disease diagnosis-tests and performance evaluation"- by **S. Zahan**- The aim of the paper is to present the results of the tests performed in order to evaluate the performances of a **fuzzy expert system** developed for cardiovascular disease diagnosis.
  13. "Diagnosis of Some Diseases in Medicine via computerized Experts System", by- **R.A. Soltan** , et all - This paper described a prototype model of a expert system for diagnosing and treatment heart diseases. The system uses **the rule-based reasoning technique** through simple querying of symptoms, signs and investigation done to the patient. The system can be used for diagnosing heart disease patient and then give treatment.
  14. "Generic Medical Fuzzy Expert System for Diagnosis of Cardiac Diseases", **Ali M. S** , et all - Researchers have attempted to explore the capabilities and potentialities of fuzzy expert systems for the emulation of thought in a much more general sense although confined to medical diagnosis, they have designed a Generic medical fuzzy expert system for diagnosis of cardiac diseases. **Mathematical** model is developed to predict the risk of heart disease.a generic system was designed using fuzzy methodology for medical diagnosis using visual basic and fuzzy logic tool box of MatLab software. The fuzzy expert system that was developed in visual basic and MatLab fuzzy tool box are interfaced. A strong knowledge base and rule base comprising more than 1000 rules exclusively pertaining to heart disease is the main backbone of the system. The system accepts inputs in the form of physiological, radiological and clinical parameters from the user. Moreover, the user can select general as well as specific symptoms from the prebuilt symptoms library.
  15. "ANN based Expert System to Predict Disease in Cardiac Patients at Initial Stages" by-**Umer Rashid**,- Researcher has developed an expert system for the preliminary investigation of cardiac abnormality in human beings. Researcher has used Artificial Neural Network methodology for prediction of heart abnormalities in cardiac patients at initial stages. this research is intended to employ an Artificial Intelligence (AI) technique in an automated solution, having minimum error bounds. An **ANN based expert system** is designed and developed, which identifies presence or absence of cardiac disease in patients by considering best practiced disease symptoms.
  16. "Design of an Optimized Fuzzy Classifier for the Diagnosis of Blood Pressure with a New Computational Method for Expert Rule Optimization" by **Juan Carlos Guzman**, et all - In this study, Researchers have developed a model using **Neuro-Fuzzy Hybrid techniques** that actually implements the human reasoning using a set of decision rules for the study of different diseases such as Hypertension Blood pressure (HBP). based on the classification of Hypertension, according to the definitions of the European Guidelines.
  17. "A Fuzzy Rule Base System for the Diagnosis of Heart Disease", by-**Manisha Barman**, et all -In this paper a **fuzzy rule based system** for the diagnosis of the heart disease has been presented. The developed system has seven inputs .These are Chest pain type, resting blood pressure in mm (Trestbps),Serum cholesterol in mg(Chol),Numbers of Years as a smoker(years), fasting of blood sugar(fbs), maximum heart rate achieved(thalach), resting blood rate(trestbpd). The angiographic disease status of heart of patients has been recorded as output. It is to state that diagnosis of heart disease by angiographic disease status is assigned by a number between 0 to 1, that number indicates whether the heart attack is mild or massive, The Cleveland database has been used to make this study. Various membership functions have been used as input. Here an effort has been made to decide suitable membership function for proper diagnosis of heart disease. Three types of membership functions viz **gaussian, triangular and trapezoidal** membership functions have been attempted. Based on the minimum value of absolute residual the particular membership function can be decided for the fuzzy rule base system with an objective of the proper diagnosis of a patient.It has been shown that Fuzzy rule base system using Gaussian membership function has given best result as compared to other membership functions. For patient 1 with the characteristics :blood pressure during resting time as 145, serum cholesterol 233 mg, maximum heart rate as 60,blood rate during rest as 90 , the person is having fasting blood sugar, the person can be treated as a smoker for 20 years with a typical angina(chest pain type angina value 1 ), the output ( angiographic disease status) has been observed as 0.276 usingfuzzy rule base system. The original status for patient 1 is 0. Thus for patients 1 ,the absolute residual (derivation from original) is 0.276.For patient 2, the observed output status using fuzzy rule base system is 0.845 as against the original status as 1 with absolute residual (derivation from original) is 0.155.For patient 19, the observed status using fuzzy rule base is 0.845 as against the original status as 1 with absolute residual (derivation from original) is 0.155.According to the output (angiographic disease status) for all the patients can be ascertained



18. "Hypertension Diagnosis Using Fuzzy Expert System", By- **Rupinder Kaur & Amrit Kaur**-In this study, researcher have designed a fuzzy expert system to diagnose hypertension for different patients. This **Fuzzy expert** system is based on set of symptoms and rules. The input parameters for this system are age, body mass index, blood pressure, heart rate, diabetes, physical activity, genetics and the output parameter is risk of hypertension. Seven input variables age, BMI, heart rate, blood pressure, diabetes, physical activity and genetics are used for the fuzzification method while risk of hypertension (%) is used as output. to calculate the risk of hypertension
19. "Design and Development of Fuzzy Expert System for Diagnosis of Hypertension", By- **Nur Farahiyah Mohammad et al** - The aim of this study is to design a **Fuzzy Expert System** for diagnosis of hypertension risk for patients aged between 20's, 30's and 40's years and is divided into male and female gender. The input data is collected from a total of 10 people which consists of male and female with different working background. The parameters used as input for this fuzzy expert system were age, Body Mass Index (BMI), blood pressure and heart rate. Hypertension is diagnosed if blood pressure is over than 140/90mmHg. For current progress the input used is- age, BMI, heart rate and blood pressure are used as input for the fuzzification method while risk of hypertension (%) is used as output. As per researcher Fuzzy expert system design is very appropriate compared to the Bayesian Statistics, Statistical and other methods. This is because fuzzy expert system can simulate as an expert doctors behavior in order to diagnose diseases.
20. "Artificial Intelligence in Hypertension Diagnosis: A Review", By- **Arpneek Kaur & Abhishek Bhardwaj**- This paper presents an introduction and survey on different artificial intelligence methods used by researchers for the application of diagnosing or predicting Hypertension
21. "An expert system for diagnosis of the heart valve diseases", By- **Ibrahim Turkoglu et al** - In this paper, an expert diagnosis system is presented for interpretation of the Doppler signals of the heart valve diseases based on the pattern recognition. This paper especially deals with the feature extraction from measured Doppler signal waveforms at the heart valve using the Doppler Ultrasound. Wavelet transforms and short time Fourier transform methods are used to feature extract from the Doppler signals on the time-frequency domain. Wavelet entropy method is applied to these features. The **back-propagation neural network** is used to classify the extracted features.
22. "Design of A Fuzzy Expert System And A Multi-Layer Neural Network System For Diagnosis Of Hypertension", By- **Zeinab Abrishami & Hamid Tabatabaee**,- In this study, researcher has used two methods for the diagnosis of the hypertension. Firstly, a **Fuzzy Expert system (FEs)** is introduced for the diagnosis of the hypertension in adults. The input parameters include Systolic Blood Pressure (SBP) and Body Mass Index (BMI). Secondly, the **multilayer neural network (MNN)** with 5 inputs, 5 hidden layers and 1 output is employed for the diagnosis of the hypertension. The inputs include, smoking, age, weight and BMI. Finally the results of two systems (FEs and MNN) are compared individually. And proved that Fuzzy Expert Systems can actually implements the human intelligence and reasoning than any other methodology of AI
23. "Diagnosis of valvular heart disease through neuralnetworks ensembles", By- **Resul Das et al** ,- In this paper, researcher has introduce a methodology which uses SAS Enterprise Miner5.2 was used to construct a **neural networks ensemble-based methodology** for diagnosing of the valvular heart disease. A neural networks ensemble method is in the centre of the proposed system. The ensemble-based methods creates new models by combining the posterior probabilities or the predicted values from multiple predecessor models. Experiments were conducted on the valvular heart disease at a set to diagnose heart disease in a fully automatic manner. Three independent neural networks models were used to construct the ensemble model.
24. "Artificial Neural Networks in Cardiology - ECG Wave Analysis and Diagnosis Using Backpropagation Neural Networks" ,By- **Syed Khursheed ul Hasnain et al** ,- The developed system the Computerized Patient Monitoring System, analyzes ECG waves in both time and frequency domain with real time processing capabilities. The network does dynamic studies of the wave with point-to-point calculations and 2D wave pattern recognition. The system also has learning abilities for learning custom ECG patterns and their related abnormalities, and this can be used to store up to 25 reference abnormal ECG patterns to be used for future diagnostic calculations. The system learns in both on and off line modes and thus produces results in real time. The data acquired by the system can be used with a database management system so that it can be viewed anywhere in the hospital using hospital's LAN. Furthermore the data can also be communicated on the Internet, this system uses **Back propagation neural network** methodology
25. "Expert System for Diagnosis of Heart Disease: A Review", by - **Suresh Nagar & Arvind Kumar Jain**- This paper focuses on today's most severe heart related diseases. discusses different expert systems that are presently used in the field of medical sciences. In addition to this, a brief survey of related papers is also discussed. Moreover, it



describes the well known database used for heart disease diagnosis. Researcher has developed Clinical **Decision Support System** for heart diseases, which gathers the patient health information and by using predetermined **algorithms or rules**, System outputs in the form of probability for patient been prone to heart diseases.

26. "Expert System for Heart Problems", By- Dr. S. Govinda Rao, This paper focuses on **Fuzzy Expert System** for heart problems. The system has 11 input fields and one output field. This is **rule based** and having required data with respect to kind of chest problem, blood pressure, cholesterol, resting blood sugar, maximum heart rate, resting electrocardiography, exercise, previous peak, thallium scan, sex and age. The result will show the status (is there) of heart problem of the man. It has the index of values by starting from 0 to 4 (1, 2, 3, and 4).
27. "A Fuzzy Expert System for Heart Disease Diagnosis", By- **Ali Adeli & Mehdi Neshat**- Researchers have designed a **Fuzzy Expert System** for heart disease diagnosis. The designed system based on the V.A. Medical Center, Long Beach and Cleveland Clinic Foundation data base. The system has 13 input fields and one output field. Input fields are chest pain type, blood pressure, cholesterol, resting blood sugar, maximum heart rate, resting electrocardiography (ECG), exercise, old peak (ST depression induced by exercise relative to rest), thallium scan, sex and age. The output field refers to the presence of heart disease in the patient. It is integer valued from 0 (no presence) to 4 (distinguish presence (values 1, 2, 3, 4)). This system uses Mamdani inference method.
28. "A Neural Network Expert System for Diagnosing and Treating Hypertension", By- Riccardo Poli- This article describes Hypernet (Hyper-tension Neural Expert Therapist), a **neural network expert system** for diagnosing and treating hypertension. The tools they have developed for implementing this system is a **compiler** for a simple descriptive language that enables to define, train, and test networks; a graphic editor that translates the network drawn by the user into the proper statements; and a set of programs for interactively generating the examples. After describing the data used as examples, the learning phase, and the results of tests for evaluating the performance of each network.
29. "A Fuzzy Expert System For Diagnosis And Treatment Of Musculoskeletal Disorders In Wrist", By- **Fatemeh Mohammadi Amiri & Ameneh Khadivar**- Researchers have designed an expert system for diagnosis and treatment of musculoskeletal disorders in wrist in **fuzzy environment**, MATLAB software. The knowledge is achieved from 15 elites in the field of musculoskeletal disorders. For data gathering related to symptoms of the disorders, a **fuzzy Delphi method** is used. A Delphi method is also used for gathering data related to treatments. The designed system is able to diagnose seven disorders of the wrist. The input to the system is the magnitude of symptoms and the output is the scores given by the system to disorders; finally, the disorder with the highest score is displayed as the systemic diagnosis for which treatments are suggested. The systemic diagnosis is compared to elite diagnosis using statistical analysis conducted by SPSS software. Results show a significant correlation between two variables. By comparing the variables, it is found that 86,7 % of the systemic diagnoses were similar to elite diagnoses. In the absence of elites, diagnosis and treatment can be performed to a relatively reliable level. As results of current research, medical expert systems can be used as a scientific source by medical students. It can also help users as an auxiliary diagnostic system to diagnose and treat diseases.
30. "Threshold Neuro Fuzzy Expert System for Diagnosis of Breast Cancer" by- **Bh. Nagarajasri, M. Padmavathamma**- In this paper researcher has proposed an ARM Cortex-M3 Based Interactive **Neuro Fuzzy Expert System** for diagnosis of breast cancers proposed on an Ex-DBC System for benign and malignant digital mammographic findings. In order to assist physicians, Radiologists and others in clinical diagnosis, a wide set of breast cancer detection rules was designed using Digital Mammographic dataset are discussed in this paper.
31. "U-health Expert System with Statistical Neural Network", By- **Byoung-Ho Song et al** ,- Ubiquitous Health(U-Health) system which focuses on automated applications that can provide healthcare to human anywhere and anytime using wired and wireless mobile technologies is becoming increasingly important. This system consists of a **network system** to collect data and a sensor module which measures pulse, blood pressure, diabetes, blood sugar, body fat diet with management and measurement of stress etc, by both wired and wireless and further portable mobile connections. They have proposed an expert system **using back-propagation** to support the diagnosis of citizens in U-Health system. They have implemented user interface module of U-Health System for Biometric Data sensing & Expert System for automatic Diagnosis and comprehensive diagnosis system in association with hospital DBs. The expert system **using back-propagation** to support the diagnosis. This system consists of a network system to collect data and a sensor module which measures pulse, blood pressure, diabetes, blood sugar, body fat diet with management and measurement of stress etc, by both wired and wireless connections.
32. "RULE-BASED EXPERT SYSTEM FOR DISEASE DIAGNOSIS" By- **Moshood A. Hambani**- This paper addresses the various challenges that exist in the traditional method of disease diagnosis. A **rule-based**



**expert system** is developed to diagnose Malaria, Typhoid Fever, Cholera, Tuberculosis, and Breast Cancer. The proposed Medical Expert System (MES) contains forty six (46) rules to effectively diagnose the diseases.

33. "Reasoning Techniques for Diabetics Expert Systems", by- **Ibrahim m.ahmed et all** .- This paper focus on the main technical characteristics of four reasoning methodologies which are commonly used in developing diabetic expert systems, namely; reasoning with production rules, fuzzy reasoning, case-based reasoning, and ontological-case based reasoning. On the basis of their study the researcher has proposes the best reasoning technique for diabetic expert systems. The main result of this study covers a variety of four reasoning methodologies, which reveals that case based reasoning paradigm is the best reasoning technique methodology regarding to the issues of maintenance ,powerful and knowledge representations .The abilities of inference, reasoning, and learning are the main features of any expert system. The research area in this field covers a variety of reasoning methodologies, e.g.; **case-based reasoning, ontology case-based reasoning, fuzzy reasoning and rule reasoning**. Case based reasoning is the more efficient, powerful and less cost. they have developed an expert system for diabetes diet that intended to be used in Sudan and Arab countries . they have implement an intelligent mobile base expert system in Arabic language interface using the case based reasoning as reasoning technique

34. "A Simulation-Based Expert System for Daylighting Design", by-**Jaime M. Lee & Marilyn Andersen**- In this paper, researcher has propose an expert system for daylighting in architecture which is used to guide a goal-oriented, user-interactive design process. This system is supported by a **knowledge-base** which has been populated using a set of previously completed simulations using the Design of Experiments methodology. The knowledge-base contains information regarding the effects of a variety of design conditions on resultant daylighting performance. Eighty different design conditions are considered, encompassing two different values of ten design variables on four facades. Daylighting effects are considered for three times of day, for three seasons, and for five zones. The use of the knowledge-base as both a stand-alone resource and as a component of the expert system is considered. Within the expert system, the knowledge-base provides customized information based on user inputs and guides an iterative process which improves daylighting performance of the user's original design .A daylighting expert system has potential to act as a virtual daylighting consultant and to guide designers towards improved designs during the schematic design phase. A preliminary study has shown to improve designs for a variety of goal complexities. The present paper proposes a more

comprehensive knowledge-base with an expanded set of design variables. This knowledge-base is valuable both within the expert system framework and as a stand-alone resource. As a stand-alone, the knowledge-base can provide information for a variety of situations which can be used directly to inform a designer during the design process. Within the expert system, the knowledge-base provides the necessary intelligence to guide the user towards design decisions which will approach the user defined performance goals within specific user-defined design constraints.

35. "The Design of an Expert System for Domain Knowledge Engineering and Decision Making: A Case Study in the Criminal Justice System ", By-Owusu - Ansah Agyapong and Patrick O. Bobbie- In the paper, researcher has described the rationale(a set of reasons or a logical basis for a course of action or belief.) for developing the **DSS** system, they have focus on the criminal (juvenile) justice system, the methodology for eliciting DSS domain knowledge, and a scenario of what they are implementing as a proof of-concept system. A series of elicitation sessions which epitomize the DSS system have been discussed in the article.A DSS for eliciting information pertaining to case-handling, case-actions, and case-stages of juvenile criminality in a typical (e.g., the Florida) JJS, has been described. The menu-driven characteristic of the elicitation system, coupled with the underlying propositional calculus, facilitates and simplifies the complexity of the elicitation process. The resultant specification is viewed as a collection of associations of juvenile cases, case histories, case relations, and case -attributes. The associations, or relationships, in turn prescribe the case-actions and case-stages. A major part of the elicitation system is implemented in **PROLOG**; with the **case-elicitation interface** currently under development using Tcl/Tk tool. In this article, they have shown, by way of examples, the inference or deductive capability of the DSS in support of decision-making on case information in the DSS's knowledge-base. Such a capability is demonstrated through a proof -procedure, which is essentially a theorem-proving system. The implementation of the system currently serves as a testbed for modeling and prototyping a DSS for handling cases in a JJS.
36. "A Real Time Expert System -Adapting Match Algorithms and Implementinga Tailored Rule Language", By-**Yanik Kim Challand**- This report describes the design and the implementation of a hard **real time expert system**. It studies the possibility to use expert system in safety critical environments. The real time expert system is comprised of three elements. A **time predictable match algorithm** designed for the purpose of this project. A **rule language** that aims at making the expert system's limitations clear to the experts coding the rules. A system for **finding the actions of the rules** that are



matched by the algorithm. The system is developed for the SCJ2, a safety critical profile for Java. The tool SARTS is intended to provide analysis to the developers using the expert system. This project shows that hard real time expert system are possible, but not usable in a real development environment due to the scalability problems of the analysis tool chosen.

37. "Tools And Techniques For Knowledge-Based Expert systems For Engineering Design" by-M.L.Maher et al , - This study describes The development of a KBES for Engineering design they had chosen a simple problem to illustrate various features of Expert System programming languages they had considered Three languages ,OPS5, SRL, and PROLOG ; to illustrate different representation formalisms-rules, frames, and logic commonly used in the development of expert systems and they proved that SRL is **very useful for implementing the hierarchical design process**. SRL requires the user to write the inference mechanism in LISP.

38. " Expert Systems Techniques In A Computer-Based Control System Analysis And Design Environmen", By-J. D. Birdwell et al , - Researcher has explore the **fusion of expert control system analysis and design tools** into a prototype computer environment. The use of expert systems technology allows the transfer of recent developments in control system design to users who may not be experts in either theoretical developments or computer technology, in a vehicle which provides considerable design flexibility. The technology does not provide as general a framework as, for example, a command language based environment; however, in specific applications, such as system modeling and linear control systems, it is useful and appropriate.

39. "Expert System, Fuzzy Logic, and Neural Network Applications in Power Electronics and Motion Control", By- Bimal k. Bose, - This paper gives a brief but comprehensive review of the three branches of artificial intelligence, i.e., expert system, fuzzy logic, and neural network. The theoretical principles of each that are relevant to power electronics and motion control applications are described in a simple manner in order to make them comprehensible to the readers with power electronics background. Then, several applications .Fuzzy logic and neural network technologies are in the process of fast evolution.

40. "Design, Development and Validation of Expert Systems: A Survey of Developers", By- Daniel E. O'LEARY This paper has presented the results of a **survey of expert** systems developers on designing, developing and validating expert systems. This study supplements previous theoretical analysis and case studies. The prototyping development methodology is found to lead to more robust systems. However, prototyping apparently does not increase the difficulty

of validating systems, probably because of the increased level of communications. Prototyping seems to take less effort than a software engineering approach.

41. "Approach to Building a Web-based Expert System Interface and Its Application for Software Provisioning in Clouds", By-Evgeny Pyshkin & Andrey Kuznetsov- This paper focuses on a generalized approach to providing user interface to a web-based expert system (WBES). In order to leverage the strength of the MVC/MVP design patterns they have propose a special **ontology representing** a user communication domain. They have designed a **self-service networked infrastructure** for automatic deployment of command line interface (CLI) applications. And have demonstrated how to apply the proposed ontology for the design of a WBES aimed at supporting client software re-execution in clouds. In this paper they have examined the problem of CLI application provisioning in clouds. Being a web application interacting with a cloud broker in order to manage cloud resources and their configuration, the proposed infrastructure provides a **PaaS platform** to deploy CLI applications as SaaS services. In contrast to existing solutions they have proposed an architecture where a proxy component and an executor don't interact directly. Instead of invoking each other, they assert or retract facts in/from an expert system working memory. The proposed architecture addresses some of the most complex tasks of client virtual machine automatic reconfiguration, including the following:

1. Installing operating systems on a virtual machine;
2. Installing and configuring a build environment;
3. Installing and configuring a required version of a runtime environment;
4. Installing third party libraries during building;
5. Installing third party runtime libraries;
6. Providing access to machine learning and test data;
7. Providing access to a storage for execution results;
8. Providing user-side access to a client virtual machine.

they have investigated MVC and MVP design patterns and the major difficulties of their application to implementing a user interface for a web-based expert system. And they have introducing a special ontology representation user communication concepts, with respect to the loose coupling design requirements, which, in turn, are strongly connected to improving software quality properties as reusability and changeability. With regards to the demands of scientific communities.

42. "A Methodology To Design An Expert System For Remote Sensing Technology Management." By-





- Andrew Finegan-** This paper examines an alternative approach to the analysis of the complex problems associated with the management of remote sensing technology. Soft Systems Methodology is introduced as an effective and efficient way of undertaking a systems analysis of interdependent technological and human processes. A systems model based on an Australian study is presented for remote sensing technology transfer. It is demonstrated that this model provides a practical framework upon which to develop a **rules-based expert system**. This paper has discussed some of the difficulties associated with knowledge elicitation, and introduces Soft Systems Methodology as a theoretical framework for examining complex and poorly defined problems. The case study illustrates the application of Soft Systems Methodology to the problem of remote sensing technology management I and suggests that this approach is a suitable method for knowledge elicitation in expert system development
43. "Web-Based Expert System for Civil Service Regulations: RCSES", By-**Mofreh A. Hogo & Khaled Fouad**- The work presented in this paper tries to overcome the general lack of research in the area of web-based expert systems (WBES). The paper addressed the issues associated with the analysis, design, development, and use of web-based expert system for the regulations of the civil service system in the K.S.A "RCSES", with methodology the ontology for knowledge representation, The work considered 17 regulations for the civil service and its ability to modify or updating and the extending of the existing regulations. The "RCSES" was verified, and validated by different technical users and the developers as well to be usable in the real world governmental departments. The developed RCSES is implemented to run on the web using ASP.net techniques as the main programming language, and a server-side technology, **XML-Rule-based knowledge** sources and the inference mechanisms are implemented using ASP.net
  44. "A Proposed Methodology For Expert System Engineering", By-**Yasser Abdelhamid et al** ,-Central Laboratory for Agricultural Expert Systems-in this paper is the result of accumulated experience gained through many years of developing several expert systems in the agricultural domain by the Central Laboratory for Agricultural Expert Systems (CLAES). They have adopted a **spiral model** development methodology. they have considered two aspects: Knowledge engineering, and Software engineering. From the knowledge engineering aspect, they have adopted the Common KADS methodology, and model driven approach has been applied. From the software engineering aspect, there are four activities for expert system development: requirements specification, design, implementation, and testing.
  45. "The Methodology of Expert Systems", By-**Kantureeva Mansiyaet al** ,- The article considers design methodology of expert systems, structure of the base components, studies stages of expert system's creation, provides basic data on the ways of representation of knowledge in expert systems
  46. "An introduction to expert systems and Knowledge acquisition techniques", By-James R. Heatherton- This report is the by-product of information collected by the authors during research into expert system technology conducted at the Air Force Institute of Technology. That research involved methods for selecting appropriate tools (or "**knowledge acquisition techniques**") to collect information from experts. In the course of the research, the authors discovered that no single publication discussed all of the collection techniques that a knowledge engineer might want to evaluate. This brief report attempts to remedy that deficiency by consolidating into one document the primary knowledge acquisition techniques used today. For each technique, the authors have provided a short description, evaluation, and bibliography for individuals who want to evaluate a technique in greater depth. The discussion of techniques is introduced by an overview of some issues and architectures of expert system design
  47. "A comparison of knowledge acquisition techniques Used in the development of expert systems", by- **James R. & Heatherton, B.A.**- This thesis shows the **comparison between three knowledge acquisition techniques** used to gather knowledge for the development of an expert system and to determine which technique produced knowledge in a form most suitable for incorporation into an expert system. The three acquisition techniques compared were interviewing, task observation, and concept mapping. Three experts were selected and randomly paired with a technique. Knowledge acquisition sessions were then conducted with each expert using the technique assigned to that expert. The knowledge extracted from these acquisition sessions was then compared. Overall, concept mapping produced more rules, in less time, and with fewer inferences than the interview or task observation techniques. Additionally, the knowledge base acquired through the concept mapping technique was more complete. Finally, concept mapping required one less translation of the knowledge to arrive at a form necessary for programming the expert system. An expert system was developed using the concept mapping technique and was validated in a field test. Results showed that the solutions provided by the expert system matched those provided by the human experts
  48. "Simulating a feed forward artificial neural Network in C++", By- **Dr. Durga toshinwal et al** ,- This report presents an overview of how a feed forward



**artificial neural network** can be implemented in C++. They have designed **An Artificial neural network system** composed of many simple processing elements operating in parallel whose function is determined by network structure, connection strengths, and the processing performed at computing elements or nodes. A neural network is a massively parallel distributed processor that has a natural inclination for storing experiential knowledge and making it available for use. This report also provides a brief overview of artificial neural networks and questions their practical applicability, as well as explanation of the design and implementation of a three - layer feed forward **neural network using back propagation algorithm**.

49. "A methodology for building expert systems", by **Howard Hill**, The work is a comparative study of a methodology, or process, that can be used to construct expert systems in this respect the Author has build a several systems, to find the superior methodology use for building expert system and compared with the methodology that is generally discussed in the literature. And the findings was that the superior methodology suited primarily for building troubleshooting, advisory, and diagnostic expert systems; and also can be useful for building other types of systems. And proved that **traditional process of knowledge engineering can be improved by applying a concept software engineers**.
50. "Hybrid Approach Combining Machine Learning and a Rule-Based Expert System for Text Categorization", By - **ulio Villena - Román et al** - This paper discusses a **novel hybrid approach** for text categorization that combines a machine learning algorithm, which provides a base model trained with a labeled corpus, with a **rule-based expert system**, which is used to improve the results provided by the previous classifier, by filtering false positives and dealing with false negatives. The main advantage is that the system can be easily fine-tuned by adding specific rules for those noisy or conflicting categories that have not been successfully trained. they also describe an implementation based on **k-Nearest Neighbor and a simple rule language to express lists of positive, negative and relevant (multiword) terms appearing in the input text**. The system is evaluated in several scenarios, including the popular Reuters-21578 news corpus for comparison to other approaches, and categorization using IPTC metadata, EUROVOC thesaurus and others.
51. "DeepVesselNet: Vessel Segmentation, Centerline Prediction, and Bifurcation Detection in 3-D Angiographic Volumes", By- **Giles Tetteh et al** .- Authors have presented a **DeepVesselNet**, an architecture tailored to the challenges to be addressed when extracting vessel networks and corresponding features in 3-D angiography using deep learning. They also have discussed the problems of low execution speed and high memory requirements associated with full **3-D convolutional networks**, high class imbalance arising from low percentage (less than 3%) of vessel voxels, and unavailability of accurately annotated training data - and offer solutions that are the building blocks of DeepVesselNet. Firstly ,they have formulate **2-D orthogonal cross-hair filters which make use of 3-D context information**. Second, they introduce a class balancing cross-entropy score with false positive rate correction to handle the high class imbalance and high false positive rate problems associated with existing loss functions. Finally, they have generate synthetic dataset using a computational angiogenesis model, capable of generating vascular networks under physiological constraints on local network structure and topology, and use these data for transfer learning. DeepVesselNet is optimized for segmenting vessels, predicting centerlines, and localizing bifurcations. They have tested the performance on a range of angiographic volumes including clinical Time-of-Flight MRA data of the human brain, as well as synchrotron radiation X-ray tomographic microscopy scans of the rat brain. Their experiments show that, by replacing 3-D filters with 2-D orthogonal cross-hair filters in network, speed is improved by 23% while accuracy is maintained. They have proved class balancing metric is crucial for training the network and pre-training with synthetic data and helps in early convergence of the training process
52. "Retinal Vessel Segmentation Using Deep Neural Networks" , By- **Martina Melinscak et al** .- They have presented an approach using **deep maxpooling convolutional neural networks with GPU implementation** to segment blood vessels and results show that it is promising method. their method yields the highest reported AUC for the DRIVE database.
53. "Retinal Vessels Segmentation Techniques and Algorithms: A Survey" By- **Jasem Almotiri et al** .- Retinal vessels identification and localization aim to separate the different retinal vasculature structure tissues, either wide or narrow ones, from the fundus image background and other retinal anatomical structures such as optic disc, macula, and abnormal lesions. Retinal vessels identification studies are attracting more and more attention in recent years due to non-invasive fundus imaging and the crucial information contained in vasculature structure which is helpful for the detection and diagnosis of a variety of retinal pathologies included but not limited to: Diabetic Retinopathy (DR), glaucoma, hypertension, and Age-related Macular Degeneration (AMD). With the development of almost two decades, the innovative approaches applying computer-aided techniques for segmenting retinal vessels are becoming more and more crucial and coming closer to routine clinical



applications. The purpose of this paper is to provide a comprehensive overview for retinal vessels segmentation techniques. Firstly, a brief introduction to retinal fundus photography and imaging modalities of retinal images is given. Then, the preprocessing operations and the state of the art methods of retinal vessels identification are introduced. Moreover, the evaluation and validation of the results of retinal vessels segmentation are discussed. Finally, an objective assessment is presented and future developments and trends are addressed for retinal vessels identification techniques.

54. "MRI white matter lesion segmentation using an ensemble of neural networks and overcomplete patch-based voting", by- **José Manjón et al**- Accurate quantification of white matter hyperintensities (WMH) from Magnetic Resonance Imaging (MRI) is a valuable tool for the analysis of normal brain ageing or neurodegeneration. Reliable automatic extraction of WMH lesions is challenging due to their heterogeneous spatial occurrence, their small size and their diffuse nature. In this paper, they have presented an automatic method to segment these lesions based on an ensemble of overcomplete patch-based neural networks. The proposed method successfully provides accurate and regular segmentations due to its overcomplete nature while minimizing the segmentation error by using a boosted ensemble of neural networks. In this paper, authors have presented an **automatic method to segment** these lesions based on an ensemble of overcomplete patch-based neural networks. The proposed method successfully provides accurate and regular segmentations due to its **overcomplete** nature while minimizing the segmentation error by using a boosted ensemble of neural networks. The proposed method compared favourably with many state-of-the-art methods in two different MRI datasets and can be a good choice to perform large-scale brain analysis studies
55. "Environmental Impact Assessment for Iron Ore Mines – An Expert System", by- **E. Kumar**- An attempt has been made to generalize the issues in effective Environmental Impact Assessment (EIA) with a special attention to iron ore mines. It is of high priority to address the potential environmental impact issues that may arise due to proposed mining activities i.e. an assessment of the potential impacts of a project on the existing environment. India produces approximately 200 MT iron ore per year which is the principal raw material in construction industry and allied industries. No doubt that the demand for such deposit is quite high both for domestic and export market. In reality the rate of environmental impacts is also equally high. Many of iron ore mines have been abandoned due to environmental degradation and hazards in mining areas which causes a major concern. The technical reasons attributed for such abandonment being
- lack of application of proper environmental management skills and effective environmental impact assessment. Environmental engineers have to come out with modifications in EIA for iron ore mines in order to accelerate the productivity with an eco-friendly approach.
56. "Designing an Expert System for Differential Diagnosis of B-Thalassemia Minor and Iron-Deficiency Anemia Using Neural Network" by- **Rahil Hosseini Eshpala, et al** ,- It is a developmental study with a cross-sectional-descriptive design. The statistical population included CBC results of 395 individuals visiting for premarital tests from 21 March to 21 June, 2013. For development of the neural network, MATLAB 2011 was used. Different training algorithms were compared after error propagation in the neural network. Finally, the best network structure (concerning diagnostic sensitivity, specificity, and accuracy) was selected, using the confusion matrix and the receiver operating characteristic (ROC). The proposed system was based on a **multi-layer perceptron algorithm** with 4 inputs, 100 neurons, and 1 hidden layer. It was used as the most powerful differential diagnosis instrument with specificity, sensitivity and accuracy of 92%, 94%, and 93.9%, respectively.
57. "Prototype Development of MODELER: A Knowledge Based System for Identification of Iron Ore Deposit Types", By- **Indranil Roy And B. C. Sarkar**- Geological knowledge of associations between field evidence and deposit types for a range of iron ore deposits have been consolidated and structured into a rule-based prototype system, MODELER that is able to assist exploration geologist for diagnosing iron ore deposit types. The system contains knowledge on eighteen deposit models represented by eighteen compound rules based on the concepts of type area and genetic type. This paper focuses on the design and development of the system and its application to five iron ore deposits from eastern India, The approach to iron ore deposit type identification using the MODELER system provides a quick and pragmatic means for rapid diagnosis of a deposit type. The prototype system possesses an open architecture for further modification and updating of the knowledge base and reasoning strategy. Further enrichment of the knowledge base can be achieved by incorporating sub-classes of the Sokolov and Grigor'ev (1977) classification after accumulation and aggregation of information from the studied deposits. The open architecture of the system enables it to incorporate other mineral deposit types also
58. "Development of a knowledge base for diagnostic reasoning in cardiology", By- **William J. Wang**, This paper reports on a formative evaluation of the diagnostic capabilities of the Heart Failure Program, which uses a probability network and a heuristic hypothesis generator. Using 242 cases



collected from discharge summaries at a tertiary care hospital, they have compared the diagnoses of the program to diagnoses collected from cardiologists using the same information as was available to the program. With some adjustments to the knowledge base, the Heart Failure Program produces appropriate diagnoses about 90% of the time on this training set. The main reasons for the inappropriate diagnoses of the remaining 10% include inadequate reasoning with temporal relations between cause and effect, severity relations, and independence of acute and chronic diseases

59. "A web-based system for neural network based classification in temporomandibular joint osteoarthritis"- The findings of this study demonstrate a comprehensive phenotypic characterization of TMJ health and disease at clinical, imaging and biological levels, using novel flexible and versatile open-source tools for a web-based system that provides advanced shape statistical analysis and a neural network based classification of temporomandibular joint osteoarthritis. The technological methodologies in this study include a deep neural network classifier of 3D condylar morphology (ShapeVariationAnalyzer, SVA), and a flexible web-based system for data storage, computation and integration (DSCI) of high dimensional imaging, clinical, and biological data.
60. "Heterotropia Diagnosis with Smartphone using Computer Vision and Machine Learning", By- **Harsh Gupta** -In this paper, a deviation-based algorithm is proposed which exploits the power of TensorFlow, OpenCV, and machine learning to diagnose four forms of heterotropia -esotropia, exotropia, hypertropia and hypotropia. The mechanism developed for lateral, vertical, and angular deviation has been tested for KNN, SVM, and a trained neural network, based on 6 features. Finally, the accuracy, specificity, and sensitivity of the 2 MLC and convolutional neural network (CNN) was tested in a study of 337 users with and without heterotropia. Eyeris, an Android based application, has been developed as a proof of concept for this paper. The results yielded highest accuracy for SVM-based classification
61. "A Neural-Fuzzy SOM Based Approach On Brain Tumor Detection From MRI Images", By- **Nikita Sarawat & Neeraj Kumar**- In this paper, presents an effective strategy for brain tumor characterization, where, the brain tumor pictures are arranged into typical normal, non-dangerous (Benign) brain tumor and destructive (Malignant) brain tumor. This paper introduces an efficient method approached of brain tumor classification and segmentation, where, the brain tumor images are generally classified into a normal or non-cancerous (benign) brain tumor detection and cancerous (malignant) brain tumor detection. The proposed method follows three steps, (1) pre-processing for Gaussian filter, (2) textural feature extraction for glcm and (3) SOM classification. Gaussian filter is first utilized utilizing for evacuate commotion the brain picture into various levels of rough and itemized coefficients and after that the dim level co-event matrix is framed, from which the surface measurements, for example, vitality, differentiate, relationship, homogeneity and entropy are achieved. The results of co-occurrence matrices are then fed into a SOM (self-organizing map) for further classification and tumor detection with fuzzy partition matrix clustering and segmentation.
62. "CardioSmart365: Artificial Intelligence in the Service of Cardiologic Patients", By- **Efrosini Sourla, et al** - This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Artificial intelligence has significantly contributed in the evolution of medical informatics and biomedicine, providing a variety of tools available to be exploited, from rule-based expert systems and fuzzy logic to neural networks and genetic algorithms. Moreover, familiarizing people with smartphones and the constantly growing use of medical-related mobile applications enables complete and systematic monitoring of a series of chronic diseases both by health professionals and patients. In this work, they have proposed an integrated system for monitoring and early notification for patients suffering from heart diseases. CardioSmart365 consists of web applications, smartphone native applications, decision support systems, and web services that allow interaction and communication among end users: cardiologists, patients, and general doctors. The key features of the proposed solution are (a) recording and management of patients' measurements of vital signs performed at home on regular basis (blood pressure, blood glucose, oxygen saturation, weight, and height), (b) management of patients' EMRs, (c) cardiologic patient modules for the most common heart diseases, (d) decision support systems based on fuzzy logic, (e) integrated message management module for optimal communication between end users and instant notifications, and (f) interconnection to Microsoft Health Vault platform. CardioSmart365 contributes to the effort for optimal patient monitoring at home and early response in cases of emergency.
63. "Application of Artificial Neural Networks in the Heart Electrical Axis Position Conclusion Modeling", by- **L N Bakanovskaya** - The article touches upon building of a heart electrical axis position conclusion model using an artificial neural network. The input signals of the neural network are the values of deflections Q, R and S; and the output signal is the value of the heart electrical axis position. Training of the network is carried out by the error propagation method. The test results allow concluding that the created neural network makes a conclusion with a high degree of accuracy.



64. "Project of an Expert System Supporting Risk Stratification and Therapeutic Decision Making in Acute Coronary Syndromes", **By-Marcin Grabowski, et al.** The aim of the project was to create a computer program - expert system, which will support a doctor when a management for patients with acute coronary syndrome needs to be chosen. The expert system consists of four modules: knowledge base, previous cases database, inference engine and explanation module. Knowledge base was created with support of clinical experts, based on current management standards, guidelines and results of clinical trials according to evidence-based medicine rules. Data from new patient are added to the case database. Inference engine integrates two types of reasoning rule-based and case-based reasoning. Computer expert system gives unambiguous and objective answer. Recommendation given by an expert system can be reliable. At present the system is tested in clinical practice. Strategies recommended by the system are compared to the management applied in patients treated in Cardiology Clinic.
65. "Mobile Application for Health Prediction Using Data Mining and Tracking Data for Health Monitoring", **By-Robin Humn**, It might have happened such a lot of times that you simply or somebody yours want doctors to facilitate forthwith, however they're not on the market thanks to some reason. The Health Prediction system is associate user support and on-line consultation project with mobile Application. Here I propose a system that enables users to urge instant steerage on their health problems through associate intelligent health care system. The system is fed with numerous symptoms and also the disease/illness related to those systems. The system permits the user to share their symptoms and problems. It then processes user's symptoms to envision for numerous sicknesses that might be related to it. Here they tend to use some intelligent data processing techniques to guess the foremost correct ill health that might be related to patient's symptoms. In doctor module once doctor login to the system doctor will read his patient details and also the report of that patient. The doctor will read details regarding the patient search what patient sought for per their prediction. The doctor will read his personal details. Admin will add new sickness details by specifying the sort and symptoms of the sickness into the info. supported the name of the sickness and symptom the information mining rule works. Admin will read numerous sickness and symptoms hold on in info.
66. "SURVEY PAPER ON BRAIN TUMOR SEGMENTATION TECHNIQUES", **by- Spoorthi Rakesh, et al**-Image processing is used widely in solving a variety of problems. The important and complex phase of image processing is image segmentation. This paper provides a brief description on some of the segmentation algorithms specifically on brain tumor MR Images.
- Later in this paper, simple comparisons are made between the listed algorithms. This work helps in understanding some of the existing brain MR Image segmentation algorithms better
67. "A Rule Based System to Identify Negative Sentences from Text Documents", **by- Amarjeet Kaur & M. Sasikumar**, Segmentation is one of the most important processes in Digital Image Processing. Segmentation means divide or partition an image into multiple parts. Image **segmentation** is used to segment the parts of the image for processing. The glaucoma disease directly affects the optic nerve, and it becomes blindness. Blindness is an increasing disease of all over the world. If this eye diseases were detected earlier mean the blindness can be avoided at the earliest stage. Blood vessel segmentation can perform an important role in the diagnosis and treatment of different cardiovascular and ophthalmologist diseases. The main aim of this work is detection of glaucoma. In this research work, the segmentation of blood vessels and detection of glaucoma is done by using Black and White Area (BWAREA) method. The experimental results are evaluated such as accuracy, sensitivity and specificity.
68. "Segmentation of Blood Vessel in Retinal Images and Detection of Glaucoma using BWAREA and SVM" **by- P. Dhivyabharathi**- Segmentation is one of the most important processes in Digital Image Processing. Segmentation means divide or partition an image into multiple parts. Image **segmentation** is used to segment the parts of the image for processing. The glaucoma disease directly affects the optic nerve, and it becomes blindness. Blindness is an increasing disease of all over the world. If this eye diseases were detected earlier mean the blindness can be avoided at the earliest stage. Blood vessel segmentation can perform an important role in the diagnosis and treatment of different cardiovascular and ophthalmologist diseases. The main aim of this work is detection of glaucoma. In this research work, the segmentation of blood vessels and detection of glaucoma is done by using Black and White Area (BWAREA) method. The experimental results are evaluated such as accuracy, sensitivity and specificity.
69. "Heterotropia Diagnosis with Smartphone using Computer Vision and Machine Learning", **By-Harsh Gupta**, In this paper, a **deviation-based algorithm** is proposed which exploits the power of TensorFlow, OpenCV, and machine learning to diagnose four forms of heterotropia -esotropia, exotropia, hypertropia and hypotropia. The mechanism developed for lateral, vertical, and angular deviation has been tested for KNN, SVM, and a trained neural network, based on 6 features. Finally, the accuracy, specificity, and sensitivity of the 2 MLC and convolutional neural network (CNN) was tested in a study of 337 users with and without heterotropia. Eyeris, an Android-based application,



has been developed as a proof of concept for this paper. The results yielded highest accuracy for SVM-based classification Index Terms—heterotopia, machine learning, neural networks, computer vision

70. "Prediction of Coronary Heart Disease Using Risk Factor Categories", **By-Peter W.F. Wilson**- This work was designed as a prospective, single-center study in the setting of a community-based cohort. The patients were 2489 men and 2856 women 30 to 74 years old at baseline with 12 years of follow-up. During the 12 years of follow-up, a total of 383 men and 227 women developed CHD, which was significantly associated with categories of blood pressure, total cholesterol, LDL cholesterol, and HDL cholesterol (all  $P < .001$ ). Sex-specific prediction equations were formulated to predict CHD risk according to age, diabetes, smoking, JNC-V blood pressure categories, and NCEP total cholesterol and LDL cholesterol categories. The accuracy of this categorical approach was found to be comparable to CHD prediction when the continuous variables themselves were used. After adjustment for other factors, 28% of CHD events in men and 29% in women were attributable to blood pressure levels that exceeded high normal ( $\$130/85$ ). The corresponding multivariable-adjusted attributable risk percent associated with elevated total cholesterol ( $\$200$  mg/dL) was 27% in men and 34% in women. Recommended guidelines of blood pressure, total cholesterol, and LDL cholesterol effectively predict CHD risk in a middle-aged white population sample. A simple coronary disease prediction algorithm was developed using categorical variables, which allows physicians to predict multivariate CHD risk in patients without overt CHD. (Circulation. 1998;97:1837-1847.)

## 5. Books Review

- 1) Artificial Intelligence A Modern Approach By Stuart J. Russell and Peter Norvig
- 2) Development of a Knowledge Base for Diagnostic Reasoning in Cardiology By William J. Long, MIT Laboratory for Computer Science, Cambridge, MA, USA Shapur Naimi and M. G. Criscitiello New England Medical Center Hospital, Boston, MA, USA April 13, 1994
- 3) A Practical Introduction to Rule Based Expert Systems By M Sasikumar, S Ramani, S Muthu Raman, KSR Anjaneyulu, R Chandrasekar
- 4) Computing in Cardiology 2010, Belfast, UK September 26- 29, 2010 Belfast, UK

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2. Tomasz HRAPKOWICZ, et al, "Decision making process in cardiac surgery – concept of building an expert

- 5) Knowledge –Based System in BANKING SECTOR By Dr. R.V Kulkarni & B.L. Desai
- 6) Rule-based expert systems By Bruce G. Buchanan, Edward Hance Shortliffe
- 7) Expert systems programming: practical techniques for rule-based systems By Ken Pedersen
- 8) Verification and Validation of Rule-Based Expert Systems By Suzanne Smith, Abraham Kandel
- 9) Programming expert systems in OPS5: an introduction to rule-based programming By Lee Brownston
- 10) Intelligent Systems: A Modern Approach By Crina Grosan, Ajith Abraham

## 6. Literature Review Summary

The researcher has taken extensive review of Literature on the topic selected.

Following is the summary of the review taken :

Sr. No	Books	Journal	PhD Theses	Other Research Work
1	10	56	6	8

## 7. Research Gaps

Researcher has found considerable study in this area but a special study is not done specifically related to Diagnosis of Selected Cardiac Diseases therefore the researcher intends to design and develop an Expert System for Diagnosis of Selected Cardiac Diseases.

## 8. Conclusion

Expert systems have shown many advantages such as utilization of experts' knowledge, gaining rare knowledge, more time for assessment of the decision, more consistent decisions, and shorter decision-making process. In spite of all these advantages, there are challenges ahead of developing and using such systems including maintenance, required experts, inputting patients' data into the system, problems for knowledge acquisition, problems in modeling medical knowledge, evaluation and validation of system performance, wrong recommendations and responsibility, limited domains of such systems and necessity of integrating such systems into the routine work flows. We concluded that expert systems can be successfully used in medicine; however, there are many concerns and questions to be answered through future studies and discussions.



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