Future ICT 2022: The Third International Symposium on Future ICT

Fushin Hotel Taichung

Taichung, Taiwan, January 17-21, 2022

Conference website	https://sites.google.com/view/futureict2022/
Submission link	https://easychair.org/conferences/?conf=futureict2022
Abstract registration deadline	January 7, 2022
Submission deadline	January 12, 2022

Topics: artificial intelligence of things | blockchain technologies and its applications | artificial intelligence applications | future technological development

NEW Program (Time Table and links)

https://drive.google.com/drive/folders/10XBvAsgla1sfxxTUl2H3xM-xPRoGipiZ?usp=sharing

Future ICT 2022

CALL FOR PAPERS

This is the third International Symposium on Future Information and Communication Technology (Future ICT 2022). The advance smart applications based on future Information and Communication Technology would utilize all of continuously evolving and converging information and communication technologies, including Artificial Intelligent (AI), Cognitive Technologies and Applications, Transformative Computing, Blockchain Technology, Big Data, Data Ming, Digital Content Convergence, Multimedia Convergence, Smart Applications, Expert Systems, Embedded Systems, Mobile and Wireless Communications, Broadband Networks, Software Defined Networks (SDN), Bio-Inspired Computing, Grid and Cloud Computing, Semantic Web, User Experience and Human-Computer Interaction (HCI), Soft Computing, Smart Computing, Toy Computing, Security and Trust computing, Blockchain Technologies and Its Applications, Semiconductor Technology and Manufacturing Process based on Future Technological Development, Industrial Management and so on, for satisfying our ever-changing needs.

In the future world, ICT will play a highly important role in convergence of fast computing together with high-speed communications, and all other smart

computational sciences and application and ICT also will influence the future world's various areas, including science, engineering, industry, business, law, politics, culture, medicine, and so on. However, there still exits lots of challenges in future ICT. The advance smart applications based on future ICT and fast computing together with high-speed communication. Our symposium is intended to bring up the dissemination of state-of-the-art research in all future ICT areas, including their models, services, and novel smart applications associated with their utilization.

The symposium will provide an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of the advance smart applications based on future ICT and the relative Security. The symposium will publish high quality papers, which are closely related to the various theories and practical applications in the area of the advance smart applications based on future ICT and the relative communications and networks. In addition, we expect that the symposium and its publications will be a trigger for further related research and technology improvements in this important subject.

Submission Guidelines

All papers must be original and not simultaneously submitted to another journal or conference. The following paper categories are welcome:

- **Full Papers Submission.**

Authors are invited to submit original papers: they must not substantially duplicate work that any of the authors have published elsewhere or have submitted in parallel to any other conferences that have proceedings. An accepted paper must be registered before the registration deadline and presented at the symposium. Failure to register before the deadline will result in automatic withdrawal of the paper from the symposium proceedings and the program.

The submission of contributions to **Future ICT 2022** must occur through the symposium submission system:

Paper submission Online: (To use **Internet Explorer is better than Google Chrome** !!!!!)

- **Paper style(s):**
- **1.** The submission file is in PDF format produced via the Easychair Latex Class file (US letter size). [Available at http://jowua.yolasite.com/resources/easychair.zip]
- **2. Microsoft Word (If you use Microsoft Word to produce your article, you will need to submit two documents: a .docx file and a PDF file derived from it. You can use "Save As" menu item and choose Word**

Document (.docx) and PDF as the formats. Click here to download the latest Microsoft Word template - EasyChair : https://easychair.org/publications/easychair.docx

- **Page size:** Each paper should be at least 4 pages long based on the Easychair style.
- **Duty of registration and presentation:** Submission of a paper implies that should the paper be accepted, at least one of the authors will register and present the paper at the symposium.

List of Topics

- AIoT (Artificial Intelligence of Things) and its Advance or Future Applications
- Blockchain Technologies and Its Applications
- Blockchain Technologies and Its Security
- Semiconductor Technology and Manufacturing Process based on Future Technological Development
- Artificial Intelligence Applications
- Information Security Regarding to Novel Scenarios for Future Applications
- Expert Systems and their Advance or Future Applications
- Knowledge-Based Systems and their Advance or Future Applications
- Smart Computing and its advance or Future Applications
- Smart Manufacturing and its Advance or Future Applications
- Smart E-Business and its Advance or Future Applications
- Smart Healthcare and its Advance or Future Applications
- Smart Living and its Advance or Future Applications
- Smart Campus and its Advance or Future Applications
- Smart City and its Advance or Future Applications
- Smart Agriculture and its Advance or Future Applications
- Smart Home and its Advance or Future Applications
- Smart Education Systems and their Advance or Future Applications
- Cognitive and Biologically Inspired Solutions for Security and Cryptography Big Data and their Advance or Future Applications
- Cognitive Technologies or Applications

- Transformative Computing Technologies or Applications
- Context-Aware Scheme and its Advance or Future Applications
- Smart Spaces and Intelligent Environments and their Advance or Future Applications
- Embedded Systems and Wearable Computing and their Advance or Future Applications
- Middleware and Agent Technologies and their Advance or Future Applications
- Pervasive and Ubiquitous Computing and their Advance or Future Applications
- Mobile Communications and Wireless Communications and their Advance or Future Technologies
- Wireless Ad-Hoc Networks and Wireless Sensor Networks and their Advance or Future Technologies
- Mobile Internet, Mobility Management and their Advance or Future Applications
- Wireless Sensors, Ad-Hoc, Mesh Networks and their Advance or Future Applications
- Networks and Interconnection Networks for Green Computing
- Parallel Computing, Distributed Computing Reliability and Fault Tolerance
- Ubiquitous Computing Applications and their Advance or Future Applications
- Security Threats, Security Policies and Secure Managements, Security Schemes, Secure Protocols, Cryptography and their Advance or Future Applications, e.g. AI applications, Big Data, Blockchain-based Technologies and Applications
- Digital Forensic, Privacy and Trust and their Advance or future Applications, e.g. AI applications, Big Data, Blockchain-based Technologies and their Applications
- Advanced Technologies in Semiconductor Device based on GaN and other Materials
- Quantum Cryptography and Future Applications
- Fluid Mechanics and Future Applications
- Instrumentation Automatic Control and Future Applications
- Physical Layer Security for Vehicle to Everything (V2X) and Future Applications
- Reconfigurable Intelligence Surfaces and Future Applications
- Industrial Management

- Others in the Advance or future ICT Area.

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[More PC members are being invited]

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Invited Keynote Speakers

- Chin-Chen Chang( ), Chair Profsessor, Feng Chia University, Taiwan (Jan.17, 2022)

- **Chair Professor Chang** has worked on many different topics in information security, cryptography, multimedia image processing and published several hundreds of papers in international conferences and journals and over 30 books. He was cited over 35,600 times and has an h-factor of 86 according to Google Scholar. Several well-known concepts and algorithms were adopted in textbooks. He also worked with the National Science Council, Ministry of Technology, Ministry of Education, Ministry of Transportation, Ministry of Economic Affairs and other Government agencies on more than 100 projects and holds 17 patents, including one in US and two in China. He served as Honorary Professor, Consulting Professor, Distinguished Professor, and Guest Professor at over 50 academic institutions and received Distinguished Alumni Award's from his Alma Master's. He also served as Editor or Chair of several international journals and conferences and had given almost a thousand invited talks at institutions including Chinese Academy of Sciences, Academia Sinica, Tokyo University, Kyoto University, National University of Singapore, Nanyang Technological University, The University of Hong Kong, National Taiwan University and Peking University. Professor Chang has mentored 58 PhD students and 184 master students, most of whom hold academic positions at major national or international universities. He has been the Editor-in-Chief of Information Education, a magazine that aims at providing educational materials for middle-school teachers in computer science. He is a leader in the field of information security of Taiwan. He founded the Chinese Cryptography and Information Security Association, accelerating information security the application and

development and consulting on the government policy. He is also the recipient of several awards, including the Top Citation Award from Pattern Recognition Letters, Outstanding Scholar Award from Journal of Systems and Software, and Ten Outstanding Young Men Award of Taiwan. He was elected as a Fellow of IEEE and IET in 1998, and a Fellow of CS in 2020 for his contribution in the area of information security.

- **Keynote title: Applying De-Clustering Concept to Information Hiding**
  - **Abstract:**Reversible steganography allows an original image to be completely restored after the extraction of hidden data embedded in a cover image. In this talk, I will talk about a reversible scheme based on de-clustering strategy for VQ compressed images. The de-clustering can be regarded as a preprocessing step to make the proposed steganographic method more efficient. Our experimental results show that the time required for the embedding process in the proposed method is few. In addition, the reversible steganography allows an original image to be completely restored after the extraction of hidden data embedded in a cover image. In this paper, we propose a reversible scheme for VQ-compressed images that is based on a de-clustering strategy and takes advantage of the local spatial characteristics of the image. The main advantages of our method are ease of implementation, low computational demands, and no requirement for auxiliary data.

• Shian-Shyong Tseng( ), Vice President, ASIA University, Taiwan

- **Shian-Shyong Tseng** received the Ph.D. degree in computer engineering from National Chiao Tung University in 1984. From 1991 to 1992 and 1996 to 1998, he acted as the Chairman of Department of Computer and Information Science at the same university. From 1992 to 1996, he was the Director of the Computer Center at Ministry of Education. He was the Dean of the College of Computer Science, Asia University from 2005 to 2008. He now acts as a Vice President of ASIA University, and is a Chair Professor there. In Dec. 1999, he founded Taiwan Network Information Center (TWNIC), and was the Chairman of the board of directors of TWNIC over 12 years. He was also a science and technology consultant of Ministry of Education from 2001 to 2005. He received TANET Lifetime Achievement Award in 2018. Dr. Tseng is an Editor-in-Chief of International Journal of Digital Learning Technology. His current research interests include artificial intelligence, data mining, computer-assisted learning, and Internet-based applications.
  - **Keynote title: A Self-evolving Approach to Buliding a Cryber-security Ontology**

• Dr. Satyendra Nath Mandal, India

- **Dr. Satyendra Nath Mandal** received B. Tech, M. Tech and PhD in computer Science and Engineering. He has over 100 research papers published in various international/national journals and conferences. He's also written ten book chapters. For his two produced softwares, earned two copyrights and he has applied for three patents for developing three tools. In 2010, he was awarded the "Career Award For Young Teachers (CAYT)" by the All Indian Council For Technical Teachers (AICTE), the Government of India. COMSYS2020, 2020, and ICACA 2021 honoured him with best paper awards. He led one multi-institutional research initiative and completed ten financed research projects. Image processing, image-based animal identification, bio-cryptography, soft computing, and image-based plant disease identification are among his research interests.
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- **Keynote title: Severity Analysis of Vegetable Foliar Diseases Using an Image-Based Disease Scoring System**
  - ***Abstract***

India is the second largest producer of vegetables next to China in the world. It is grown in India on an area of 9.575 million hectares with a yield of 17.7 mt/ha, accounting for 14 percent of global vegetable production. A variety of major and minor cucurbits are grown in India in a variety of commercial farming techniques as well as popular kitchen garden crops. Cucurbits account for around 5.6 percent of India's total vegetable output. Foliage diseases (such as downy mildew, powdery mildews, cucurbit virus, late blight, and phoma blight of potatoes) are one of the most severe fungal and pathogen-caused diseases.

Until now, the severity of foliar diseases has been evaluated using a standard disease grading scale, which is heavily impacted by subjective criteria and results in obvious mistakes. According to the disease grading scale, plant pathologists commonly assessed the incidence disease severity based on eye estimation for percent infected area. Because the disease grading methodology is mostly based on eye estimate methods, pathologists' scores differ.

For late blight of potato, an attempt has been made to develop image processing-based disease estimation. Using an image analysis technique, the late blight affected sections of leaflets, leaves, and entire plants have been examined. The percentages of impacted areas have been computed, and scores based on the suggested scale have been assigned. Based on 'Henfling's' disease scale, the given scores have been verified by multiple plant pathologists. The gap between pathologist's evaluation and image processing system has been fine-tuned by modifying the scale which leads to gain 85% accuracy on scores estimation based on proposed image analysis system which could be effectively exploited for late blight of potato disease estimation.

- Gerry Firmansyah, Executive Director of Indonesian ICT council, Indonesian

- Dr. Gerry Firmansyah, ST, M.Kom. is the Executive Director of Indonesian ICT council as well as the Head of the Master Program of Computer Science in Esa Unggul University, Indonesia. With the Doctorate degree and research focusing on Government Enterprise Architecture He was involved in several key Indonesian government Information Technology projects.
  - **Keynote title: Analysis of Human Behavior to Deal with Hoax**

    Abstract*:* The core components of Government Enterprise Architecture Framework (GEAF) comprise of business, information/data, application, and infrastructure. The architecture itself is imperative in aligning business and ICT by integrating organization and the government system. According to the study, business architecture is one of the key factor in determining the government policy's direction. Therefore, a method was proposed to compare the structure of business architecture with the governmental policy direction with the attained result. Longitudinal comparative studies was performed in this study to generate a comprehensive analysis pertaining the development of GEAF. The method was derived based on two Government Enterprise Architectures, New Zealand and The United States, in which it would be used to assessment the GEAF proposed by the Indonesian Government.

Totok Ruki Biyanto, Associate Professor, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia

- Totok Ruki Biyanto received PhD in Process and Energy Optimization from Chemical Engineering Department, University Technology PETRONAS. Associate Professor at Instrumentation, Process Control and Optimization Laboratory, Department of Engineering Physics, Faculty of Industrial Technology and Systems Engineering, Sepuluh Nopember Institute of Technology Surabaya, Indonesia (from 1997 – Now). He is lecturer, researcher and consultant in area of information and communication technologies, instrumentation, automation, safety, control and optimization in oil and gas industries, petrochemical industries, power plant, building, smart city, etc., and also expert in energy eficiency and conservasion, ITS Surabaya.
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- **Keynote title: Recent System Optimization**
  - **Abstract:** Optimization is specific method to reach the best performance and profit by determine the reasonable decision variables. Engineers utilize it to improve the initial design, to enhance the operating conditions, determine construction and maintenance schedule. Optimization have been used in the fields of science, engineering, and business. Optimization involves three major components *i.e.* optimization technique, model and problem formulation. Problem formulation consist of determine objective function, constraints, and decision variables. The objective function can be maximized the benefits or minimized losses. In design stage, the size of optimized system should be provided largest production, greatest profit, minimum cost, lowest energy consumption, lowest maintenance cost and so on. In operation stage, benefits arise from improved system performance, such as improved control performance,

reduced energy consumption, higher processing rates, and longer times between shutdowns by changing the operating conditions. The model usually a lumped parameter model that fast enough to simulate the optimization problem using recent computer capabilities, the model should be able to handle all input output variables and parameters of the system, and fairly accurate or valid to representation the system. Due to the complexities of the recent optimization problem, the stochastic algorithms aresuitable to solve the problem.

• Jayh (Hyunhee) Park, Associate Professor, Myongji University, Seoul, South Korea

- **Prof. Jayh (Hyunhee) Park** received the Ph.D. degrees in electronics and computer engineering from Korea University, Seoul, South Korea, in 2011. She joined the Faculty of Myongji University, Seoul, in 2020, where she is currently an associate professor with the department of Information and Communication Engineering. She is currently a supervisor of DAN Lab (Data Analysis and Networking). From March 2017 to February 2020, she has been working the department of computer software as an assistant professor from Korean bible university, Seoul, South Korea. From November 2014, she has been working in LG Electronics as a Senior Researcher for Wi-Fi standardization (IEEE 802.11ax, Wake Up Radio, Wi-Fi Alliance, etc.). From January 2013 to October 2014, she joined INRIA Research Center as a Postdoctoral Researcher where she works in DIONYSOS Research Group and in Telecom Bretagne as a Postdoctoral researcher where she undertakes the system implementation for QoE on wireless networks. From September 2011 to February 2013, she joined Korea University as a Research Professor. She served as the Program Co-Chair for the IMIS 2021, the Organizing Committee for the ICTC2022 and ICTC2021, and the Workshop organizer for FINGNet 2019 and 2020. She is a Guest Editor of the Electronics and Journal of Advanced Transportation. Her research interests include wireless networks, mobile edge/cloud computing, and big data analysis.
- **Keynote title: Wi-Fi 7: New Challenges and Opportunities**

Abstract: The IEEE 802.11 will release a new amendment standard IEEE 802.11be – Extremely High Throughput (EHT), also known as Wireless-Fidelity (Wi-Fi) 7. This keynote speech provides the comprehensive survey on the key medium access control (MAC) layer techniques being discussed in the EHT task group, including the multiple resource units (multi-RU) support, multiple link operations (e.g., multi-link aggregation and channel access), multiple input multiple output (MIMO) enhancement, multiple access point (multi-AP) coordination (e.g., multi-AP joint transmission), enhanced link adaptation and retransmission protocols (e.g., hybrid automatic repeat request (HARQ)). This survey covers both the critical technologies being discussed in EHT standard and the related latest progresses from worldwide research. Besides, the potential developments beyond EHT are discussed to provide some possible future research directions for WLAN.

• Fang-Yie Leu( ), Distinguished Full Professor, Tunghai University, Taiwan

- **Fang-Yie Leu** received his bachelor, master and Ph.D. degrees all from National Taiwan University of Science and Technology, Taiwan, in 1983, 1986 and 1991, respectively. His research interests include wireless communication, network security, 5G/6G network and Internet of thinks. He is currently a distinguished professor of Computer Science Department, and the chairperson of Big-data Program, TungHai University, Taiwan. He also serves as one of the editorial board members of at least 5 international journals and TPC member of at least 10 international conferences. Prof. Leu now organizes MCNCS, CWECS, MobiSec, Future ICT international conferences/workshops. He is an IEEE member and was also a visiting scholar of Pittsburg University. Prof. Leu has published more than 120 high quality journal papers (most of them are indexed by SCI) and at least 200 conference papers (most of them are indexed by EI). Currently, his 5G/6G research focuses on network slicing, DoS/DDoS, and edge computing.
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- **Keynote Title**: ***A Q-learning based downlink scheduling in 5G base stations***
- **Abstract:** Nowadays, due to the rapid growth of network service requests and popularity of IoT device deployment, wireless networks currently suffer from huge traffic produced by these requests and devices. On the other hand, 5G networks will soon available in the near future. People expect to have high quality streaming mechanisms to enrich and color their everyday lives. In a 5G network, data transmission between BS and UE is one of the biggest challenges for high-quality streaming since the bandwidth that a BS can provide is limited. The current LTE network cannot support too many connections. Besides, in order to enhance the bandwidth efficiency for a BS, in this study, we propose a 5G downlink scheduling mechanism, named the Q-learning based Scheduling and Resource Allocation Scheme (QSRAS), which deploys Q-learning techniques not only effectively imporving the quality of wireless transmission, but also efficiently managing radio resources of a BS. This scheme dynamically adjusts radio resource allocation by referring to QoS parameters. And according to our experiments and analysis, it can effectively trade-off the throughput and fairness of overall system in the multiple traffic, and is better than those state-of-the-art systems.

• Chao-Tung Yang( ), Distinguished Full Professor, Tunghai University, Taiwan (Pending)

- **Chao-Tung Yang** (Member, IEEE) received the B.Sc. degree in computer science from Tunghai University, Taichung, Taiwan, in 1990, and the M.Sc. and Ph.D. degrees in computer science from National Chiao Tung University, Hsinchu, Taiwan, in July 1992 and 1996, respectively. He is a Lifetime Distinguished Professor of computer science with Tunghai University, where he joined the Faculty of the Department of Computer Science as an Associate Professor in August 2001. His present research interests are in cloud computing and big data, parallel and multicore computing, and Web-based applications. He is a member of the IEEE Computer Society, and IICM and TACC in Taiwan.

• Hsing-Chung Chen( ), Distinguished Full Professor, Asia University, Taiwan (Pending)

- **Hsing-Chung Chen** received the Ph.D. degree in Electronic Engineering from National Chung Cheng University, Taiwan, in 2007. Since August 2019–present, he is currently Distinguished Full Professor with the Department of Computer Science and Information Engineering, Asia University, Taiwan. He is the IEEE Senior member. He is also the member of TFSA, ICCIT, CCISA , E-SAM and IET. He had been awarded the Best Paper Presentation Awards by ACM ICFET 2020 and TANET 2018, individually. He had been awarded the Best Paper Awards by BWCCA2018, MobiSec2017 and BWCCA2016, individually. Currently, his research interests include Information and Communication Security, Cyberspace Security, Blockchain Network Security, Internet of Things Application Engineering and Security, Mobile and Wireless Networks Protocols, Medical and Bio-information Signal Image Processing, Artificial Intelligence and Soft Computing, and Applied Cryptography.
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  - **Keynote title: Reconfiguable Intelligent Trust Chain Based on Blockchain Technology**

• Yeong-Sheng Chen( ), Full Professor, National Taipei University of Education, Taiwan (Pending)

- **YEONG-SHENG CHEN** (Member, IEEE) received the B.E. and M.E. degrees in computer engineering from National Chiao Tung University, Taiwan, in 1988 and 1990, respectively, and the Ph.D. degree in electrical engineering from National Taiwan University, in 1996. From 2000 to 2002, he was the Chairman of the Department of Information Management, Hwa Hsia Institute of Technology. He

joined the Department of Mathematics Education, National Taipei University of Education, as a Faculty Member, in 2002. From 2002 to 2007, he was the Director of the Computer Center, National Taipei University of Education. He is currently a Professor with the Department of Computer Science, National Taipei University of Education. From July to September 2014, he was a Visiting Scholar with the Department of Electrical Engineering, University of Washington, Seattle. His current research interests include wireless sensor networks, wireless communications, software-defined networks, network security, and context aware computing. He is a permanent member of the Institute of Information and Computing Machinery of Taiwan and a founding member of the Information Service Association of Chinese Colleges. He also served or is serving on several technical program committees for the IEEE and other international conferences.

Invited Talks

Dr. Karisma Trinanda Putra(UMY)Assistant Professor, Universitas Muhammadiyah Yogyakarta(UMY), Indonesia

- **Karisma Trinanda Putra** received his Doctoral degree from Asia University, Taiwan in January 2022. He is currently an Assistant Professor in Department of Electrical Engineering, Faculty of Engineering, Universitas Muhammadiyah Yogyakarta, Indonesia. He is also member of The Institution of Engineers Indonesia. His research interests focus on Artificial Intelligent, Machine and Deep Learning, Image Processing, Wireless Sensor Networks, Compressed Sensing, Internet of Things, Data Mining, and Big Data Analysis.
  - **Invited Talk Title:**Collaborative Deep Learning Model to Predict Pollution Propagation from Heterogenous Environmental Sensing
  - **Abstract:**Heterogeneous environmental sensory systems are not feasible. They are essentially incompatible and computationally expensive due to their massive deployments of sensory nodes. A collaborative deep learning model is proposed to extract spatiotemporal features from heterogeneous sensory systems in Taiwan. The core idea of this research is from horizontal aggregated learning to generate a more robust prediction model by enhancing the data features. A prediction model i.e., called sparse fault-tolerant collaborative learning (SFT-CL) is designed in this research. In a nutshell, the proposed model achieves accurate predictive results than the baseline increasing the robustness of the prediction model.

Dr. Cahya Damarjatilecturer, Universitas Muhammadiyah Yogyakarta (UMY), Indonesia

- **Cahya Damarjati** received the B.S. degree and the M.S. degree in Electrical Engineering from Universitas Gadjah Mada, Yogyakarta, Indonesia, in 2009 and 2015. He received the Ph.D. degree in computer science and information engineering at Asia University, Taichung,

Taiwan, in 2022. From 2015 till now, he is lecturer in Dept. of Information Technology, Universitas Muhammadiyah Yogyakarta. His research interests include Information Security, Computer Vision, and Artificial Intelligence.

- **Invited Talk Title:** An Application of Predictive Intelligence in Medicine: Hesitant Pulse Wave Detection with Its Explainability

  Abstract: Predictive intelligence models are required to assist in the diagnosis of a broad range of diseases and disorders with minimal medical data. In medicine, predictive intelligence aims to identify the earliest possible stage with the fewest clinically non-invasive facts possible. As TCM pulse palpation is a non-invasive diagnostic technique, a detailed analysis can assist doctors in determining the patient's disease and the most effective treatments. The emergence of XAI enables the incorporation of predictive intelligence components into high-precision CDSS, hence offering interpretable explanations through AI-based prediction models. Palpation is recommended to detect an early organ abnormality and a better treatment for a patient. Hesitant pulse 'semai' is one of sign that a person has initial stage of some illness. Thus, need to be early detected before a patient has a more complicated illness.

• Dr. Sunardi, lecturer, University of Muhammadiyah Yogyakarta (UMY), Indonesia

- **Sunardi** is a lecturer at the Department of Mechanical Engineering, University of Muhammadiyah Yogyakarta (UMY). Currently, he has completed a doctoral program at the Computer Science and Information Engineering Study Program, Asia University Taiwan in 2022. He earned a Masters in Engineering (M.Eng) at Gadjah Mada University Yogyakarta, Indonesia in 2014. He obtained a bachelor's degree in mechanical engineering from UMY, Indonesia in 2004. His current research focus is biomedical imaging and artificial intelligence.
- **Invited Talk Title:** Estimation of Various Walking Intensities and Plantar Tissue Stiffness Based on Plantar Pressure Data by using Artificial Intelligence Technology

  Abstract: Walking has been shown to benefit individuals include Diabetes Mellitus (DM) patients and peripheral artery disease. However, brisk walking and continuous walking could produce repetitive loads and stresses on the plantar foot resulting in increased plantar tissue stiffness and peak plantar pressure (PPP), leading to a high risk of foot ulcer formation and tissue injury. Therefore, quantifying the walking intensity is essential for rehabilitation interventions to indicate suitable walking exercise. Therefore, this study estimated various walking intensities and plantar tissue stiffness based on plantar pressure pattern data using artificial intelligence technology.

• Dr. Novi Susetyo Adi, Marine Research Center, Ministry of Marine Affairs and Fisheries, Indonesia

- **Dr. Novi Susetyo Adi** is a senior researcher on marine spatial ecology at Marine Research Center (MRC), Ministry of Marine Affairs and Fisheries (MMAF), Indonesia. He received his PhD from The University of Queensland, Australia in Marine Remote Sensing with his

thesis topic on mapping and modelling of seagrass biophysical and light environment aspects. He has mostly been working in a cross-cutting area between ecology and spatial science, encompassing coastal ecosystem mapping using satellite imageries, spatial analysis using landscape metrics; and integration of remote sensing imagery and in-situ data analysis for monitoring the condition of coastal-marine ecosystems.

• Publications

Proceedings of Future ICT 2022 will be planned to the attendees.

> All accepted papers should be presented in Future ICT 2022, and the excellent papers selected from Future ICT2022 will be directly recommended to be submitted on suitable journal(s) after an additional review process and may need extra publication charge.

SI of Journals:

1. ***Cities***: Special issue on Advances in Smart Environment for Healthy Living in Urban Cities (2020 JCR IF=5.835, Ranking Q1=1/72)

https://www.journals.elsevier.com/cities/call-for-papers/advances-in-smart-environment-for-healthy-living-in-urban-cities

2. ***ISA Transactions***: Special issue on Advances in Computational Intelligence for Perception and Decision Making for Autonomous Systems (2020 JCR IF=5.468, Ranking Q1=13/63)

https://www.journals.elsevier.com/isa-transactions/call-for-papers/advances-in-computational-intelligence-for-perception-and-decision-making-for-autonomous-systems

3. ***Applied Sciences***: Constrained Deep Reinforcement Learning for Energy Sustainable IoT Networks (2020 JCR IF=2.679, Ranking Q2=38/90) (ISSN 2076-3417) (https://portal.issn.org/resource/ISSN/2076-3417)

https://www.mdpi.com/journal/applsci/special_issues/Constrained_Deep_Reinforcement_Learning_Energy_Sustainable_IoT_Networks

4. ***Symmetry***, SCI Guest Editor (Special issue: Symmetric and Asymmetric Encryption in Blockchain), (2020 JCR IF=2.713,Ranking Q2=33/72) https://www.mdpi.com/journal/symmetry/special_issues/Symmetric_Asymmetric_Encryption_Blockchain, *Symmetry*, EISSN 2073-8994, Submission Deadline: 31 Mar. 2022.

5. ***EURASIP Journal on Wireless Communications and Networking***, (2020 JCR IF=2.455,Ranking Q3=141/273), Lead Guest Editor (Special issue: Machine Learning for Trust, Security and Privacy in Computing and Communications), https://jwcn-eurasipjournals.springeropen.com/mltdpcc, Submission Deadline: 30 Jun 2022.

6. ***Security and Communication Networks***, (2020 JCR IF=1.791,Ranking Q4=125/161), Leader Guest Editor (Special issue: Machine Learning for Security and Communication Networks 2021), https://www.hindawi.com/journals/scn/si/985145/, Submission Deadline: 1 April 2022.

In addition, some international conferences will be recommended you to transfer and submit your revised and extended papers.

After revising the titles of all accepted papers could be invited to extend and enhance, then submit to the following conferences.

1. The 36th International Conference on Advanced Information Networking and Applications (AINA-2022), University of Technology Sydney (UTS), Sydney, Australia, April 13 - 15, 2022. (Scopus and EI indexed)

   http://voyager.ce.fit.ac.jp/conf/aina/2022/index.php

1. The 16th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2022) (Scopus and EI indexed)

http://voyager.ce.fit.ac.jp/conf/imis/2022/index.php

(1)The 12-th International Workshop on Intelligent Techniques and Algorithms for Ubiquitous Computing (ITAUC-2022)

(2)The 11-th International Workshop on Sustainability Management of e-Business and Ubiquitous Commerce Engineering (SMEUCE-2022)

(3)The 8-th International Workshop on Big Data and IoT Security (BDITS-2022)

Venue

The conference will be held FUSHIN Hotel Taichung - Reservation, Taiwan

FUSHIN Hotel Taichung (http://www.fushin-hotel.com.tw/taichung/en/)

Please download the FUSHIN Hotel Taichung - Reservation From via

https://drive.google.com/file/d/13cUpLm2cuG9B_0ZBc2bxHEGLSbu8TDIw/view?usp=sharing

and send the reservation from through the email address: taichung@fushin-hotel.com.tw, TEL:+886-4-2229-7008, FAX: +886-4-2229-7009

Take High-Speed Rail

➢ Take the HSR Bus Rapid Transit: Take "159" and get off at Taichung Park. About 13-minute walk on Shifu Rd. and you are there.

➢ Walk from Wuri High-Speed Rail Station to Xinwuri Train Station and get off at Taichung Train Station. About 10-minute walk from Zhongshan Rd. (or Taiwan Blvd.) and turn left onto Shifu Rd. and walk about 700 meters.

● Take Passenger Transport / Transportation Services

➢ Chaoma Transfer Station: Walk 96 meters to Chaoyangqiao Station. Take Bus "106, 303, 304, 308, 324, 326" to the First Credit Cooperation Station and walk 82 meters to Minzu Rd. and Shifu Rd. intersection.

➢ Taichung Train Station: Get off at Taichung Train Station. Take Bus "106, 303, 304, 308, 324, 326" to Chang Hwa Bank Station and walk 189 meters to Minzu Rd. and Shifu Rd. intersection.

Contact

The conference will be held in FUSHIN Hotel Taichung (http://www.fushin-hotel.com.tw/taichung/en/).

There is any question, please send the email to cdma2000@asia.edu.tw (Hsing-Chung Chen), mosiurahaman@gmail.com (Mosiur Rahaman),

Sponsors

This Symposium has received the funding full support form Ministry of Education( ), R.O.C. Thus, the registration fee is waived for the accepted papers.

Web Based Expert System Application to Diagnose Cat Disease with Forward Chaining Method And Backward Chaining

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Abstract

Cats are a type of mammal, which is favored to be maintained and bred by many cat lovers. For example, there are Angora cat breeds, Persian cats, local cats and others. Besides that, there is a community of cat lovers who are useful, to discuss various cat diseases, which plague their pet cats. At this time there are findings of analysis and research results, which are related to cat diseases, where there are many bacteria and viruses that attack cats. This is caused by dirty environmental conditions, humid climate or temperature, even from direct contact with the host or mother of the virus. Cat disease is currently spreading rapidly due to lack of information and knowledge about the disease. Therefore, the author makes an expert system research to diagnose cat diseases, using web-based forward chaining and backward chaining methods, accompanied by methods of disease prevention and treatment, as well as ways of treating cat diseases. This system is made so that users and cat lovers understand and understand the types of cat diseases, as well as understand and understand what types of cat diseases are suffered by their pet cats. This system provides several solutions for preventing and treating cat diseases, according to the current level of cat disease. The system development method used is the waterfall method. The applications used to create this web-based expert system program are PHP my sql, Dreamweaver MX, XAMPP, Adobe Photoshop, MySQL, Opera / Mozilla Firefox. The results and objectives of this research are to produce an application program that can help users find out the type of cat disease they suffer from, and get extensive information about the types and types of cat diseases, as well as knowing treatment techniques and how to prevent them and their treatment therapies.

1 Introduction

Cats are one of the most abundant mammals in the world, including in Indonesia. There are so many types of cats in Indonesia, ranging from domestic cats commonly referred to as "village" cats to purebred cats that have beautiful fur patterns and gentle behavior. Purebred cats are usually cats that are kept by humans, although not a few have "village" cats. One example of a breed of cat such as the Persian cat, which is very often kept by humans. Cats are animals that can be used as friends for their owners (Meadows and Flint, 2019). Even though cats kept by humans are always in the house, it is possible that the cats kept are attacked by diseases, both diseases that can be seen with the naked eye or diseases of internal organs. The causes of diseases that attack cats vary, can be due to parasites that usually attack the skin, protozoa, microbes, and other factors (Subronto, 2018). At this time there are many discoveries of cat diseases, with advances in computer technology can help humans in various fields, one of which is an expert system. An expert system is a computer

program designed to model problem solving abilities like an expert. With the development of an expert system, an expert system application can be made that can diagnose cat diseases based on the symptoms and how to treat them. This system diagnoses the type of cat disease based on the symptoms experienced. Types of cat diseases contained in this system are: Coccidiosis, Tripano somiasis, Hepatozoonosis, Babesiosis, Toxoplasma Gondhii, Feline Viral Rhinotracheitis (FVR), Feline Caliciviral Disease (FCD), Feline Panleukopenia (distemper), Feline Infectious Peritonitis (FIP), Feline Viral Immunodeficiency (FIV), Ehrlichiosis, Leptospirosis, Hookworm Infection, Roundworm Infection, Tapeworm Infection, Heartworm Infection, Threadworm Infection, Scabies Mite Infection, Otodectes Cynotis Mite Infection, Flea Infection, Lice Infection. Treatments are carried out based on the identification of diseases experienced by cats that have been previously studied by experts in the form of suggestions, recommendations, appeals. The methodology used in the development of this expert system is the waterfall method consisting of: system engineering, analysis, design, coding, testing and maintenance (Pressman, 2019). Making this system until the testing stage and the program is successfully executed according to its function.

2. Literature Review

2.1 Expert System

Expert system is a computer-based system that uses knowledge, facts and reasoning techniques in solving problems that can usually only be solved by an expert in the field (Kusrini, 2019).

2.2 Advantages of Expert Systems and Disadvantages of Expert Systems

The advantages of expert systems (Kusumadewi, 2018) are: storing the knowledge and expertise of an expert, increasing output and productivity, being able to retrieve and preserving the expertise of experts, being able to access knowledge, being able to work with incomplete and uncertain information, saving time in decision making. . Weaknesses of expert systems (Arhami, 2019) are: knowledge can not always be obtained easily, the limitations of experts and sometimes the approaches that experts have are different, difficulties in making high-quality expert systems and require very large costs in development and maintenance, need to be developed and maintained. carefully tested before use.

2.3 Expert System Structure

The expert system consists of two main parts, namely: the development environment and the consulting environment (Kusumadewi, 2018).

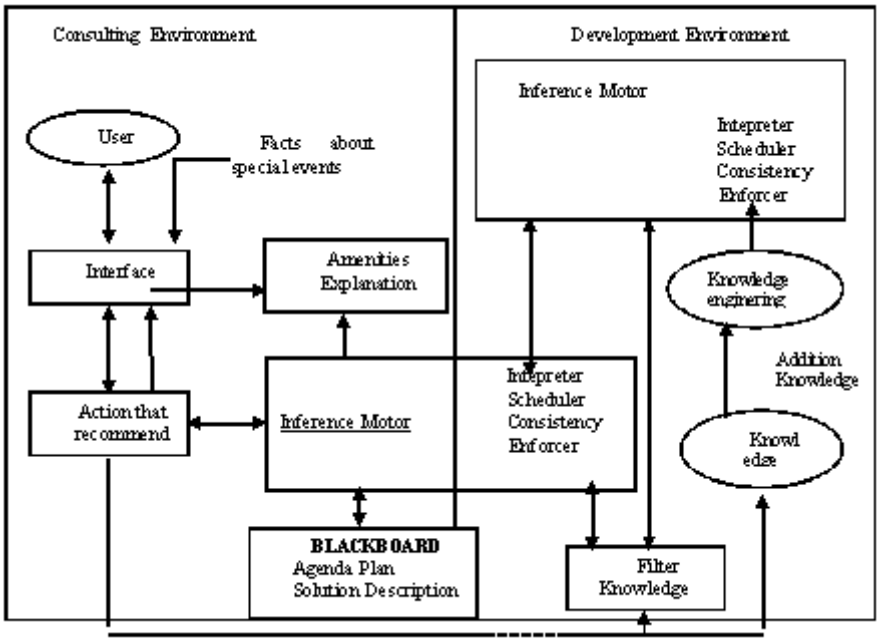

Figure 1: Expert System Structure.

2.4 Knowledge Base

The knowledge base used in this expert system uses rule-based reasoning, namely knowledge is represented by using rules in the form of if-then.

2.5 Inference Engine

There are two approaches to control inference in a rule-based expert system (Arhami, 2019), namely: Forward Chaining, reasoning starts from the facts first to test the truth of the hypothesis. Forward tracking looks for facts that match the IF part of the IF-THEN rule. And Backward Chaining, reasoning starts from the hypothesis first and to test the truth of the hypothesis, the facts must be sought. Backtracking looks for facts that match the IF-AND part of the IF-AND-THEN rule.
The two inference methods are influenced by three kinds of searches, namely Depth-first Search, which conducts an in-depth search of the rules from the root node moving downwards to successive deep levels. Breadth-first Search, moving from the root node, the nodes in each level are tested before moving to the next level. Best-first search, works based on a combination of depth-first search and breadth-first search by taking the advantages of both methods.

2.6 Cat Disease

Below there are diseases that attack cats with their causative factors, including (Subronto, 2018):
1. Parasitosis by Protozoa. Diseases that can arise are caused by protozoa such as coccidiosis, trypanosoma evansi (tripano somiasis), hepatozoon

canis (hepatozoonosis), babesia sp (babesiosis), toxoplasma gondii (toxoplasmosis).
2. Viral Infectious Diseases. Various types of viruses can attack cats. If one type of virus does not cause serious illness, on the other hand other viruses are deadly. To be able to cause illness, various conditions are needed, for example the presence of a virulent virus, the presence of sensitive tissue, and the presence of stress factors. Types of viruses that often cause serious illness include the following: Feline Viral Rhinotracheitis (FVR), Feline Caliciviral Disease (FCD), Feline Panleukopenia, Feline Infectious Peritonitis (FIP), Feline Immunodeficiency Viral (FIV).
3. Microbial Infection. Diseases that can arise due to microbial infection include: Ehrlichiosis (Tropical Canine Pancytopenia), infection by Leptospira interrogans (Leptospirosis).
4. Parasitosis by worms (gastrointestinal helminthiasis). Diseases that can arise due to parasitosis by worms such as infection by hookworms (ankylostomiasis), roundworms (ascariasis), flatworms / tape (taeniasis), liver flukes, thread worms (strongyloidosis).
5. Infestation by ectoparasites (skin parasites). Diseases that can arise due to infestation by ectoparasites (skin parasites) include infestation by scabies mites (Sarcoptes sp), mites Otodectes cynotis, infestation by fleas (phthiriasis), infestation by lice (pediculosis).

3. Analysis And Design

3.1 System Requirements Analysis

The subject of this system is to create an expert system to diagnose diseases and how to cure them. This system aims to help the user to know the type of disease the cat suffers from and how to cure it as well as information on the drugs used. The recommendation data generated in this system is equipped with the type of disease, symptoms of the disease and how to cure it so that the user can find out what disease the cat is suffering from and how to treat it. The system will analyze the answers to each question given in order to obtain answers based on the knowledge base contained in this expert system. Before analyzing the answers, the system first gives a number of questions to the user through the interface about the symptoms of the illness. The system will analyze the answers from the user by conducting a tracking process on the knowledge base.

3.2 Process Design

DAD design is used to describe the existing process hierarchy and the flow of data between processes in this system. DAD level 0 represents all system elements with a single process with input and output data indicated by incoming and outgoing arrows respectively. The system built has two external entities, namely admin and user. Admin has the authority to update data, while users can only use this system and are not authorized to update data. Users only enter data into the system, then the system will provide output to the user.

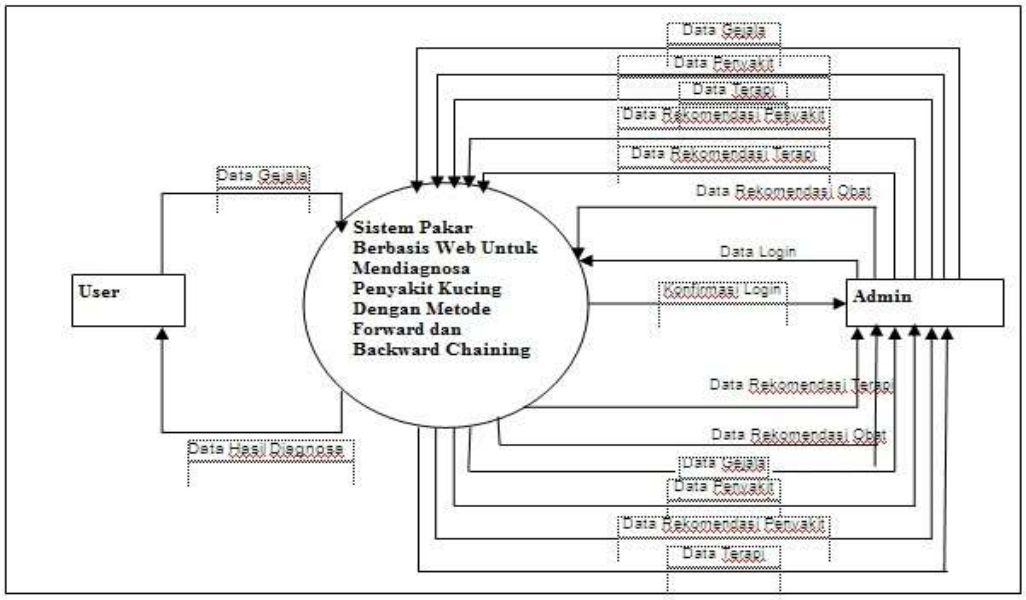

Figure 2: DAD Level 0

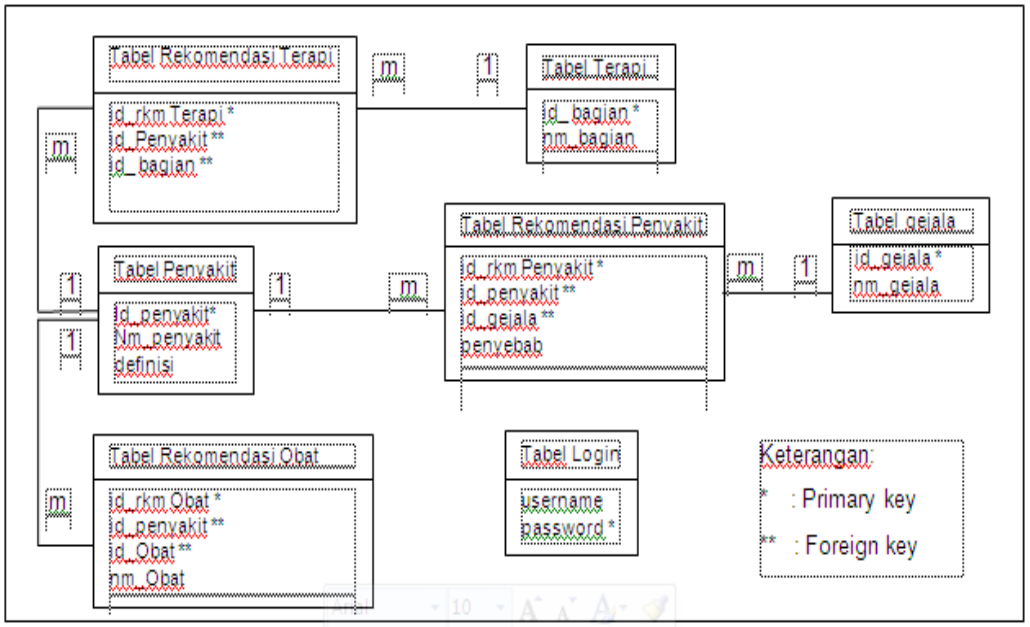

Figure 3: Relations Between Tables

3.3 Knowledge Acquisition

The knowledge acquisition process is carried out by gathering knowledge about the type of disease accompanied by symptoms, causes and treatment. The knowledge that must be acquired is the symptoms suffered.

3.4 System Design

This expert system application is designed to retrieve and identify overall data regarding the definition of disease, the cause of the disease, treatment, symptoms of the disease advance.

3.5 Knowledge Representation Design

The knowledge representation carried out to build this application uses rules-based production rules. The rule structure has two parts, namely antecedents and consequents. The conclusion stated in the THEN section is declared true, if the IF section in the system is also true or in accordance with certain rules.

The production rules in this system use two tracings, namely Forward Chaining for disease production rules and Backward Chaining for disease therapy production rules. Production rules for implementation are:

Disease Production Rules

Diseases discussed in this implementation include Basal Cell Carcinoma, Atopic Dermatitis, Allergic Contact Dermatitis, Berloque Dermatitis, Berloque Dermatitis, Bateman's purpura, Acrochordons, Angioma, Seborrheic Keratosis, Tinea pedis, Actinic keratosis, Acanthosis Nigricans. The following are the rules of disease production according to the symptoms:

a. Coccidiosis production rules

If lazy to move because of body weakness
and pale (anemic) eye and mouth mucosa
and diarrhea
then coccidiosis disease

b. Rules for Hepatozoonozi disease

if trimetho sulfadiazine
and pyrimethamine
and clindamycin
and decoquinate
then hepatozoonotic disease

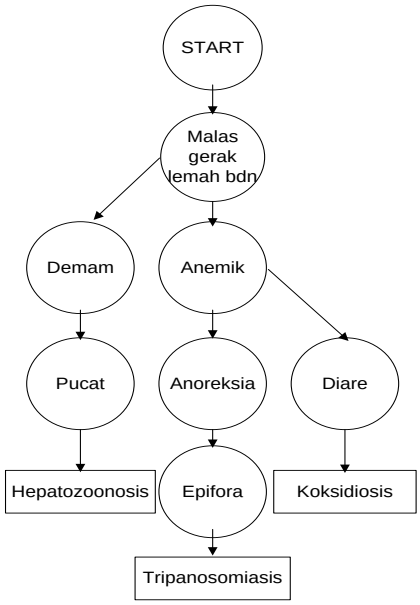

Figure 4: Example of Forward Chaining Tracking

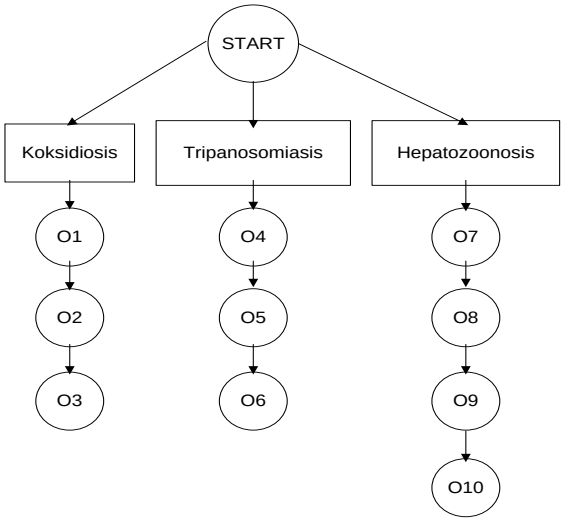

Figure 5: Example of Backward Chaining Tracking

The following table shows the acquisition of knowledge of the relationship between symptoms and cat diseases and the table of knowledge acquisition of the relationship between drugs and cat diseases are shown in the table below.

No	Id Symptom	Symptom	Koksidiosis	Tripanosom	Hepatozoon	Babesiosis	Distemper	Ankilosto	Tungau Oto	Phthiriasis	Pedikulosis
1	G1	Dehydration					*				
2	G2	Thinness				*				*	
3	G3	Lazy to move weak body	*	*	*	*	*				
4	G4	Anemic	*	*				*		*	
5	G5	Diarrhea	*				*	*			
6	G6	Fever body temperature>			*	*	*				
7	G7	Pale			*						
8	G8	Anorexia		*		*	*				
9	G9	Epiphora		*							
10	G10	Melena (defecate blood)						*			
11	G11	Jaundice (yellowish skin)						*		*	
12	G12	Lice on the body									*
13	G13	Bilateral paralysis				*					
14	G14	Limp				*					
15	G15	Decreased immunity					*				
16	G16	Halitosis					*				
17	G17	Throw up					*				

18	G18	Lesion on limbs					*	*			
19	G19	Cough						*			
20	G20	Skin inflammation						*		*	*

Table 1: Relationship between Cat Symptoms and Disease

No	Id Medicine	Medicine	Koksidiosis	Tripanosom	Hepatozoon	Babesiosis	Distemper	Ankilosto	Tungau Oto	Phthiriasis	Pedikulosis
1	O1	Ormetoprim	*								
2	O2	Tribrisen	*								
3	O3	Tortrazuril	*								
4	O4	Injection Suramin		*							
5	O5	Diminazene Aceturat		*							
6	O6	Isometamedium		*							
7	O7	Trimetho Sulfadiazine			*						
8	O8	Pyrimethamine			*						
9	O9	Clindamycin			*	*					
10	O10	Decoquinate			*						
11	O11	Trypan Blue Injection				*					
12	O12	Electrolyte Liquid					*				
13	O13	Secondary Injection					*				
14	O14	Vitamin B Complex					*				
15	O15	Telmin/Caner						*			
16	O16	Dipping							*		
17	O17	Injection							*		
18	O18	Bathing Pyrethrum								*	
19	O19	Solution Asuntol								*	
20	O20	Selamektin									*
21	O21	Injection Invermektin									*
22	O22	Bayticol 60 EC								*	

Table 2: Relationship between Medicine and Cat Disease

4. Results And Discussion

After carrying out the analysis and design stages, the next stages are:

4.1 Hardware and Software Implementation

At the stage of implementing computer hardware with the following specifications: Inter(R) Atom(TM) CPU N280 @ 1.66GHz, 1 Gb RAM, 160 Gb hardisk, Intel(R) GMA 950. And the software used is Microsoft Windows Operating System XP Home Edition Version 2017 Service Pack 3, some supporting software are: Apache Web Server 2.2.2, MySQL 5.0.21, PHP 5.1.4, PhpMyAdmin 2.8.1, Opera v.10, Web Editor : Macromedia Dreamweaver 2018, Adobe Photshop CS3, Installing Apache, PHP, MySQL and PHPMyADMIN web servers in this implementation using the XAMPP v program package. 1.5.3.

4.2 Application Development Implementation

The software used is: Macromedia Dreamweaver 2018. The consultation page contains a diagnosis of the disease by asking several questions that must be answered by the user. The following is a display of the consultation page.

Figure 6: Consultation page display.

The disease list page contains various types of cat diseases. This is a disease list page display

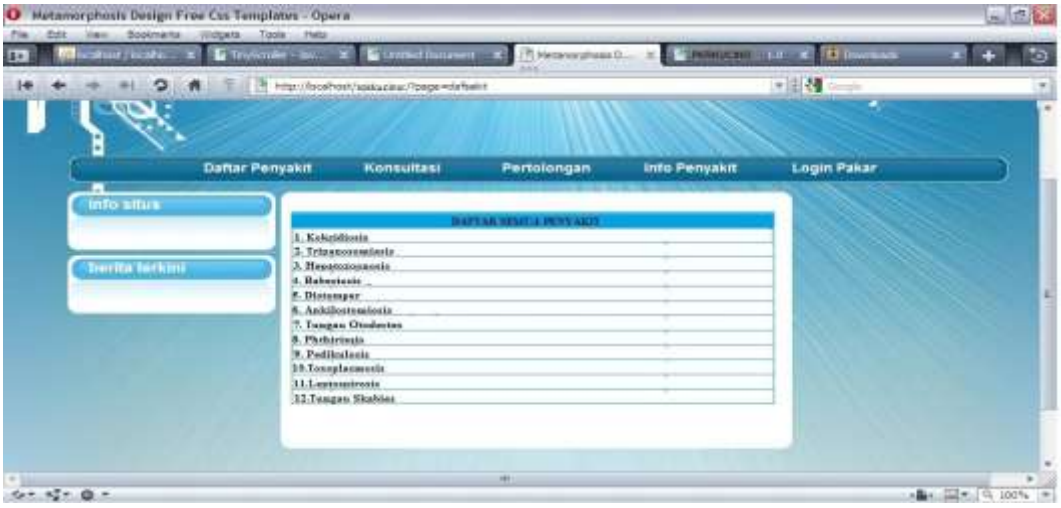

Figure 7: Display of disease list page.

The disease symptom page contains the symptoms of a type of cat disease that has been selected. The following is a display of the disease symptoms page.

Figure 8: Display of disease symptoms page.

The patient data page contains the patient's name, gender, address and occupation. The following is a display of the patient data page.

Figure 9: Cat patient data page display.

The results analysis page is in the form of conclusions drawn by the expert system based on the symptoms that have been mentioned by the user. The following is a display of the results analysis page.

Figure 10: Results analysis page display.

The login page is a page that only administrators can access. for the purposes of updating data, adding data or deleting data.

5. Conclusion

Based on the results of this study, the following conclusions can be drawn:
a. Provide information to the user about the cat's illness (initial diagnosis) based on the symptoms given.
b. Understand and acquire knowledge models for the symptoms of cat diseases.
c. Assist in early identification of cat diseases through a computer so that further treatment of the disease can be carried out quickly.
d. Provide information on treatment that can be done and how to cure it.
e. The data contained in the system can be updated or added as needed.

References

Arhami, M. (2019). *Basic Concepts of Expert Systems.* Andi Offset, Yogyakarta
Kadir, A. (2018). *Basics of Dynamic Web Programming with (JSP) Java Server Pages.* Andi Offset, Yogyakarta
Kusrini. (2019). *Expert System and Application Theory.* Andi Offset, Yogyakarta
Kusumadewi, S.(2018). *Artificial Intelligence Techniques and Its Applications.* Graha Ilmu, Yogyakarta
Meadows, Graham and Flint, Elsa, (2019) . *A Handbook for Cat Owners.* Karisma Publishing Group, Batam Center.
Nugroho, B. (2019). *Dynamic Web Programming Applications with PHP and MySQL.* Gava Media, Yogyakarta.
Prasetyo, D.D. (2019). *MySQL Server Database Administration.* Elex Media Komputindo, Jakarta
Pressman, R. (2019). *Software Engineering Practitioner Approach Book One.* Andi Offset, Yogyakarta
Sutarman. (2019). *Building Web Applications with PHP and MySQL.* Graha Ilmu, Yogyakarta
Sunyoto, Andi. (2017). *Building the Web with Asynchronous JavaScript & XML Technology.* Andi, Yogyakarta
Subronto. (2018). *Parasitic and Microbial Infectious Diseases in Dogs and Cats.* UGM Press. Yogyakarta