E-Payment and Transactions using QR Codes

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Abstract - *Expeditious growth in E-Commerce trade has led to various user centric applications throughout the world. The ever growing popularity of online shopping and ticket booking has shown new dimensions of technology. The Debit or Credit card fraud and personal information security are major issues for customers and banks particularly in the case of funds transfer or during online shopping. In this paper, an alternative method is proposed which uses application of E-Payment and Transactions using QR Codes. The proposed work was analyzed using the Unified Modeling Language (UML) and focused on creating an application for smart phones with android system.*

Key Words: E-Payment, QR-codes, Unified Modeling Language (UML).

1. INTRODUCTION

Online shopping refers to the retrieval of product related information from the vendor's site and purchase of products via Internet through fund transfer. The main concern of purchase order through electronic purchase is the filling of credit or debit card information which may end up in the hands of criminals or hackers. Identity theft, phishing and pharming are the common issues in online shopping [1, 2].

The QR Code system has become popular due to its quick readability and greater storage capacity compared to standard barcodes. A QR code (Quick Response) is a specific matrix barcode, readable by dedicated QR barcode readers or smart phones through a high resolution camera. The QR code consists of black modules arranged in a square pattern on a white background. The information usually encoded in the QR code is text, alphanumeric numbers, URL or other data [1]. Figure1 shows the structure of QR code. Moreover; QR code has a number of features such as large capacity data encoding, dirt and damage resistant, high speed reading, small print out size, 360 degree reading and structural flexibility of application [3].
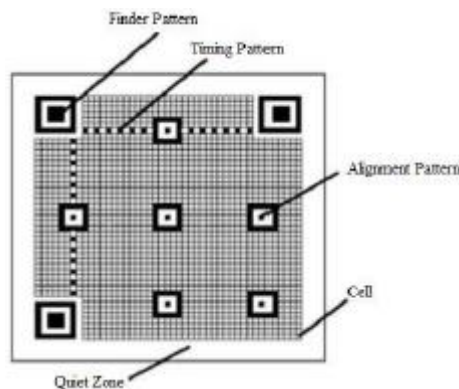

Figure -1: Structure of QR code

The rest of the paper is organized as follows; related work will be described in section 2, methodology of the proposed System will be illustrated in section 3. Proposed system prototype design will be illustrated in section 4. Results will be discussed in section 5. Finally, the conclusion is presented in section 6.

1. Related works

Foodics is a cloud-based management system for the hospitality and cafeterias business, working on the iPad as " Foodics ", in the form of "SaaS - Software as a service", which includes POS software, an Electronic menu works directly through the iPad, as well as a kitchen management system, another inventory management, suppliers and staff management, an online application management program, Call center, a program to manage customer loyalty points. Foodics system designed to hike revenues and track everything inside your business, with customisable features that cater to the requirements of your restaurant [4]. Figure 2 shows the Foodics system.

Figure -2: Foodics system [4]

Telr is an integrated platform for e-commerce solutions, providing critical services for business development for all e-merchants, whatever their size. Their e-payment portal is also of interest and care in terms of their functionality and payment processes, and the APIs open their doors to a wide variety of business models and patterns, including analytical reports, e-store, e-payments and customized payment pages [5]. Figure 3 shows Telr e-payment portal.

Figure -3: Telr e-payment portal

Moyasar (مُيسّر) is an arabic word that refers to both simplicity and usability. In essence, it means anything that is easy to do, use, or grasp. Moyasar aims to provide ePayment solutions with superior user experience and provides ePayment solutions that greatly match the current needs of your online store, yet its solutions are flexible enough to suite the user needs as the online store grows. Figure 4 show the Moyasar home page.
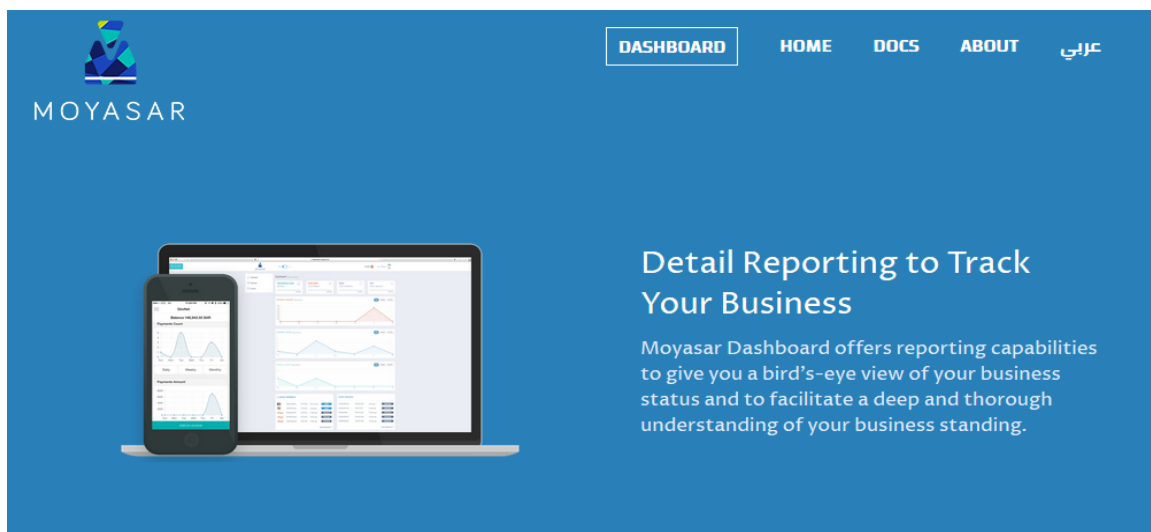

Figure -4: Moyasar home page

The technological revolution influenced everything [6-25], even the methods of E-Payment and Transactions applications for the real world issues. Today, the use of Artificial Intelligence (AI) algorithms is expansive, particularly in providing solution to challenging problems including patterns recognition and retrieval of information [21, 26-42], image segmentation [6, 7, 17, 43-48], analysis of medical image [49-53], Learning Management System [54-79], nurse rostering problem [80], Healthcare Monitoring system [20, 81], as well as prediction of river flow [82-84]. Accordingly, utilizing the AI algorithms and web technology, countless scholars have created as well as implemented E-Payment and Transactions applications systems to solve issues on various fields [85, 86].

2. Methodology

The process of system analysis aims to study an existing system to entirely design a new system. System analysis is performed to achieve mainly two aims namely:

- To understand the process or the system clearly. This will assist in the new system design.

- System analysis will help to identify the problems in the existing system; therefore this will help to know the inefficiency reasons.

The Unified Modeling Language (UML) is visualization for the system design, it represents graphical notations which help to describe and design software systems, principally software systems constructed utilizing the object-oriented style [23, 24, 76, 87-89]. The UML was utilized mainly to design the proposed system. The Use-Case diagram and the Class diagram are addressed below.

2.1 Use Case Diagram

The Use-Case Model depicts system requirements. Use-case captures the communication between system, users and other stakeholders in order to achieve the intended goal of the system. It shows the interaction between the system and external entities [23, 24, 76, 87-89]. The Actors are external entities who represent roles. They could be external hardware, human users or other systems. In this case the actors are the Student, Salesman and Banker. Figure 5 shows the use case diagram for the proposed system.
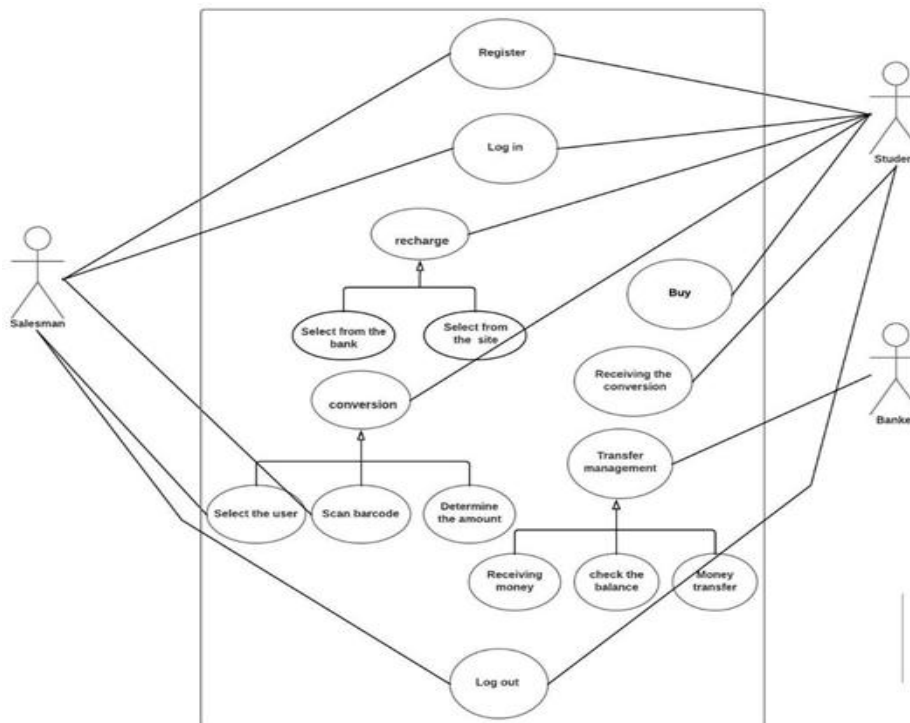

Figure -5: Use case diagram for the proposed system

2.2 Entity Relationship (ER) Diagram

The ER Diagram, a kind of flowchart demonstrates the way that entities such as concepts, objects, or people are related within a system to each other. ER Diagrams are commonly utilized to debug or design relational databases in the education and

research, business information systems and software engineering. ER diagrams are associated to Data Structure Diagrams (DSDs), which concentrates on the elements relationships within entities rather than the relationships between entities themselves [14, 15, 18, 19, 90]. In addition, ER diagrams are commonly employed along with data flow diagrams (DFDs), which delineate the information flow for systems or processes. Figure 6 shows the ER diagram for the proposed system.
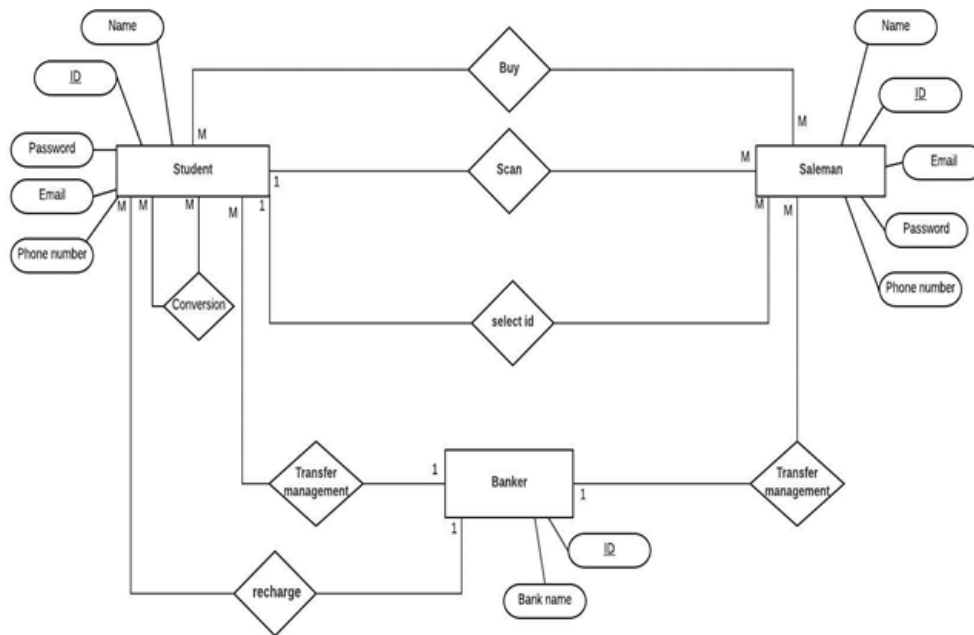

Figure -6: ER diagram for the proposed system

3. Proposed System Prototype Design

This study focused on creating an application for smart phones with android system. The main aim of the proposed system is an alternative method is proposed which uses application of E-Payment and Transactions using QR Codes. The figures below are examples of the implemented interfaces.
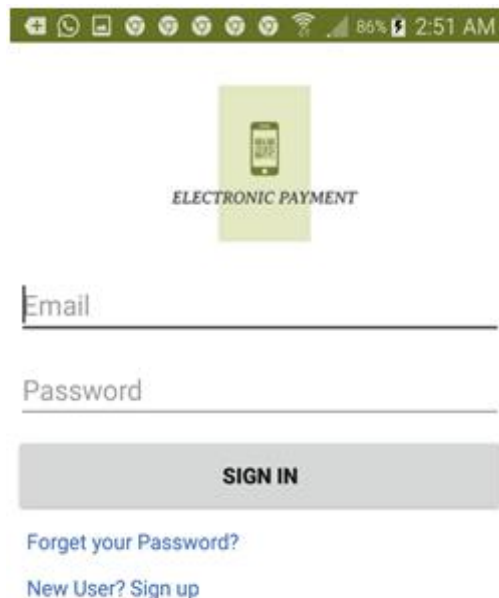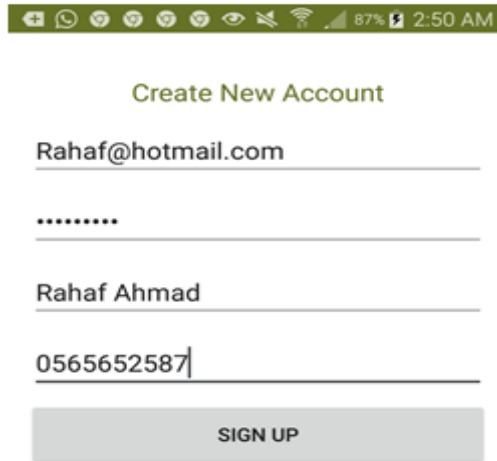

Figure -7: Login interface
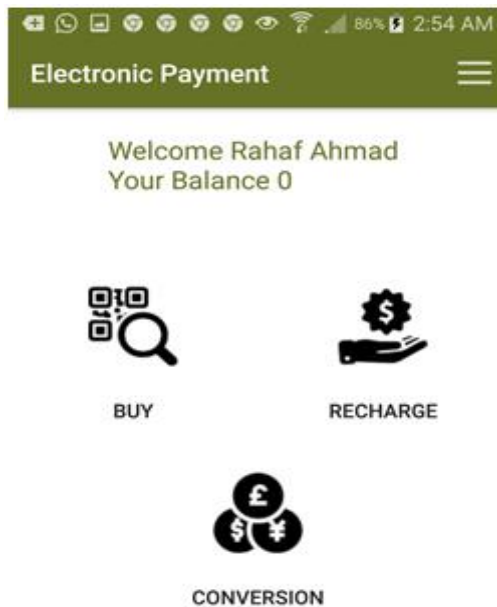
Figure -8: Registration interface

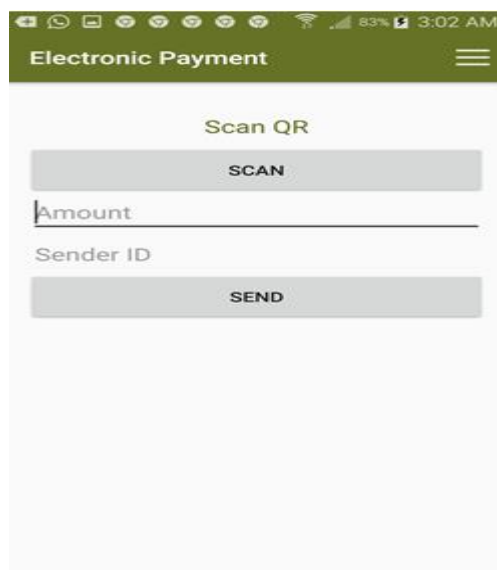**Figure -9:** Student main interface
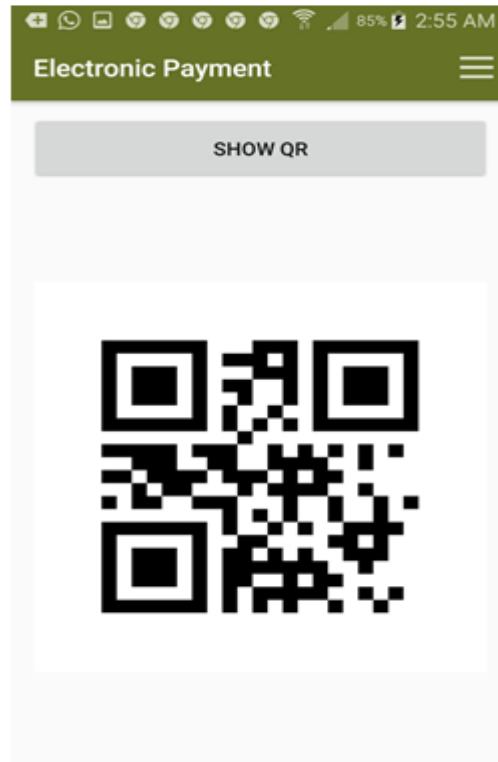

Figure -10: Scan QR interface

Figure -11: Purchase interface

4. Results and Discussion

The proposed system has been tested in order to measure its usability, where the proposed system was tested by operating using android studio. Twenty students evaluated the system prototype from Imam Abdulrahman Bin Faisal University (IAU). After given a brief explanations about how to use the system, the students have been tested the proposed system and answer the survey questionnaire (contains 10 questions measured by 5-point Likert Scale). The aim of the proposed survey is to measure the user satisfaction about the proposed system and prove its usability. The results obtained shows a high percentage of the students approve that the proposed system is usable, useful and achieved the main project target (see table 1).

Table -1: The results of data collected from the 20 students

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Strongly disagree										
Disagree										
Neutral	4	4	1	3	3	2	4	9	6	4
Agree	6	8	10	11	8	9	11	8	10	8
Strongly agree	10	8	9	6	9	9	5	3	4	8

5. Conclusion

QR codes are used in this context for e-payment system in online shopping. It provides customer data privacy and prevents misuse of customer's personal and banking data at merchant's side. The Proposed system will be easy to use, economical and does not require any special training. With phone camera feature in it, the user can scan the QR code of the item to be purchased and money can be transferred. This work proposed alternative method which uses application of E-Payment and Transactions using QR Codes. The proposed work was analysed using the Unified Modeling Language (UML) and focused on creating an application for smart phones with android system.

REFERENCES

[1]   A. Surekha, P. R. Anand, And I. Indu, "E-Payment Transactions Using Encrypted Qr Codes," International Journal Of Applied Engineering Research, Vol. 10, P. 461, 2015.

[2]   S. Roy And P. Venkateswaran, "Online Payment System Using Steganography And Visual Cryptography," In Electrical, Electronics And Computer Science (Sceecs), 2014 Ieee Students' Conference On, 2014, Pp. 1-5.

[3]   M. Jangid, M. Jiwnani, R. Sonawane, R. Varghese, S. Suryawanshi, B. Student, And K. Ndmvps's, "Smart Shopping Using Qr," International Journal Of Engineering Science, Vol. 16130, 2018.

[4]   Foodics, "Https://Www.Foodics.Com/," 2019.

[5]   Telr, "Https://Telr.Com/Ae-Ar/," 2019.

[6]   M. K. Alsmadi, K. B. Omar, S. A. Noah, And I. Almarashdah, "Performance Comparison Of Multi-Layer Perceptron (Back Propagation, Delta Rule And Perceptron) Algorithms In Neural Networks," In 2009 Ieee International Advance Computing Conference, 2009, Pp. 296-299.

[7]   Z. Thalji And M. Alsmadi, "Iris Recognition Using Robust Algorithm For Eyelid, Eyelash And Shadow Avoiding," World Applied Sciences Journal, Vol. 25, Pp. 858-865, 2013.

[8]   M. Alsmadi, U. A. Badawi, And H. E. Reffat, "A High Performance Protocol For Fault Tolerant Distributed Shared Memory (Fatp)," Journal Of Applied Sciences, Vol. 13, Pp. 790-799, 2013.

[9]   F. Haddad, J. Alfaro, And M. K. Alsmadi, "Hotelling's T^2 Charts Using Winsorized Modified One Step M-Estimator For Individual Non Normal Data," Journal Of Theoretical & Applied Information Technology, Vol. 72, Pp. 215-226, 2015.

[10]   F. Haddad And M. K. Alsmadi, "Improvement Of The Hotelling's T2 Charts Using Robust Location Winsorized One Step M-Estimator (Wmom)," Journal Of Mathematics (Issn 1016-2526), Vol. 50, Pp. 97-112, 2018.

[11]   M. K. Alsmadi, U. A. Badawi, And H. M. Moharram, "Server Failures Enabled Javaspaces Service," Journal Of Computer Science, Vol. 10, Pp. 671-679, 2014.

[12]   M. K. Alsmadi, "Apparatus And Method For Lesions Segmentation," Ed: Us Patent App. 15/614,893, 2018.

[13]   M. K. Alsmadi, "Facial Expression Recognition," Ed: Google Patents, 2018.

[14]   R. Aldaej, L. Alfowzan, R. Alhashem, M. K. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, D. Alrajhi, And M. Tayfour, "Analyzing, Designing And Implementing A Web-Based Auction Online System," International Journal Of Applied Engineering Research, Vol. 13, Pp. 8005-8013, 2018.

[15]   H. Almaimoni, N. Altuwaijri, F. Asiry, S. Aldossary, M. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, And D. Alrajhi, "Developing And Implementing Web-Based Online Destination Information Management System For Tourism," International Journal Of Applied Engineering Research, Vol. 13, Pp. 7541-7550, 2018.

[16]   I. A. Almrashdeh, N. Sahari, N. A. M. Zin, And M. Alsmadi, "Requirement Analysis For Distance Learning Management System Students In Malaysian Universities," Journal Of Theoretical And Applied Information Technology, Vol. 24, Pp. 17-27, 2011.

[17]   M. K. Alsmadi, K. B. Omar, And S. A. Noah, "Proposed Method To Decide The Appropriate Feature Set For Fish Classification Tasks Using Artificial Neural Network And Decision Tree," Ijcsns Vol. 9, Pp. 297-301, 2009.

[18]   N. Alsubaie, N. Althaqafi, E. Alradwan, F. Al-Hazza, M. Alsmadi, I. Al-Marashdeh, U. A. Badawi, M. Alshabanah, D. Alrajhi, S. Alsmadi, And M. Tayfour, "Analyzing And Implementing An Online Metro Reservation System," International Journal Of Applied Engineering Research, Vol. 13, Pp. 9198-9206, 2018.

[19]   D. A. Daniyah Alkhaldi, Hajer Aldossary, Mutasem K. Alsmadi, Ibrahim Al-Marashdeh, Usama A Badawi, Muneerah Alshabanah, Daniah Alrajhi, "Developing And Implementing Web-Based Online University Facilities Reservation System," International Journal Of Applied Engineering Research, Vol. 13, Pp. 6700-6708, 2018.

[20]   I. Almarashdeh, M. K. Alsmadi, T. Farag, A. S. Albahussain, U. A. Badawi, N. Altuwaijri, H. Almaimoni, F. Asiry, S. Alowaid, M. Alshabanah, D. Alrajhi, A. A. Fraihet, And G. Jaradat, "Real-Time Elderly Healthcare Monitoring Expert System Using Wireless Sensor Network " International Journal Of Applied Engineering Research, Vol. 13, Pp. 3517-3523, 2018.

[21]   M. K. S. Al Smadi, "Fish Classification Using Perceptron Neural Network," Centre For Graduate Studies, Universiti Utara Malaysia, 2007.

[22]   M. K. Alsmadi And U. A. Badawi, "Pattern Matching In Rotated Images Using Genetic Algorithm," Journal Of King Abdulaziz University Computing And Information Vol. 5, Pp. 53 - 59, 2017.

[23]   S. Aldossary, A. Althawadi, M. Almotairy, M. K. Alsmadi, D. Alrajhi, M. Alshabanah, I. Almarashdeh, M. Tayfour, And R. Aljamaeen, "Analyzing, Designing And Implementing A Web-Based Command Center System," International Research Journal Of Engineering And Technology, Vol. 6, Pp. 1008-1019, 2019.

[24]   R. A. Sheikh, R. Al-Assami, M. Albahr, M. A. Suhaibani, M. K. Alsmadi, M. Alshabanah, D. Alrajhi, I. Al-Marashdeh, H. Abouelmagd, And S. Alsmadi, "Developing And Implementing A Barcode Based Student Attendance System," International Research Journal Of Engineering And Technology, Vol. 6, Pp. 497-506, 2019.

[25]   A. A. Abbas, K. Alzayer, A. Alkhaldi, M. K. Alsmadi, M. Alshabanah, D. Alrajhi, I. Almarashdeh, And M. Tayfour, "Analyzing And Implementinga System For Reporting, Follow Up And Resolving Of Complaints," International Research Journal Of Engineering And Technology, Vol. 6, Pp. 1833-1842, 2019.

[26]   A. M. Al Smadi, M. K. Alsmadi, H. Al Bazar, S. Alrashed, And B. S. Al Smadi, "Accessing Social Network Sites Using Work Smartphone For Face Recognition And Authentication," Research Journal Of Applied Sciences, Engineering And Technology, Vol. 11, Pp. 56-62, 2015.

[27]   M. Alsmadi, "Facial Recognition Under Expression Variations," Int. Arab J. Inf. Technol., Vol. 13, Pp. 133-141, 2016.

[28]   M. Alsmadi, K. Omar, And I. Almarashdeh, Fish Classification: Fish Classification Using Memetic Algorithms With Back Propagation Classifier: Lap Lambert Academic Publishing, 2012.

[29]   M. Alsmadi, K. Omar, S. Noah, And I. Almarashdeh, "A Hybrid Memetic Algorithm With Back-Propagation Classifier For Fish Classification Based On Robust Features Extraction From Plgf And Shape Measurements," Information Technology Journal, Vol. 10, Pp. 944-954, 2011.

[30]   M. Alsmadi, K. B. Omar, S. A. Noah, And I. Almarashdeh, "Fish Recognition Based On Robust Features Extraction From Size And Shape Measurements Using Neural Network " Journal Of Computer Science, Vol. 6, Pp. 1088-1094, 2010.

[31]   M. K. Alsmadi, "An Efficient Similarity Measure For Content Based Image Retrieval Using Memetic Algorithm," Egyptian Journal Of Basic And Applied Sciences.

[32]   M. K. Alsmadi, "Query-Sensitive Similarity Measure For Content-Based Image Retrieval Using Meta-Heuristic Algorithm," Journal Of King Saud University - Computer And Information Sciences.

[33]   M. K. Alsmadi, A. Y. Hamed, U. A. Badawi, I. Almarashdeh, A. Salah, T. H. Farag, W. Hassan, G. Jaradat, Y. M. Alomari, And H. M. Alsmadi, "Face Image Recognition Based On Partial Face Matching Using Genetic Algorithm," Sust Journal Of Engineering And Computer Sciences (Jecs), Vol. 18, Pp. 51-61, 2017.

[34]   M. K. Alsmadi, K. B. Omar, S. A. Noah, And I. Almarashdeh, "Fish Recognition Based On Robust Features Extraction From Color Texture Measurements Using Back-Propagation Classifier," Journal Of Theoritical And Applied Information Technology, Vol. 18, 2010.

[35]   U. A. Badawi And M. K. Alsmadi, "A General Fish Classification Methodology Using Meta-Heuristic Algorithm With Back Propagation Classifier," Journal Of Theoretical & Applied Information Technology, Vol. 66, Pp. 803-812, 2014.

[36]   M. Yousuf, Z. Mehmood, H. A. Habib, T. Mahmood, T. Saba, A. Rehman, And M. Rashid, "A Novel Technique Based On Visual Words Fusion Analysis Of Sparse Features For Effective Content-Based Image Retrieval," Mathematical Problems In Engineering, Vol. 2018, 2018.

[37]   R. R. Saritha, V. Paul, And P. G. Kumar, "Content Based Image Retrieval Using Deep Learning Process," Cluster Computing, Pp. 1-14, 2018.

[38]   M. K. Alsmadi, K. B. Omar, And S. A. Noah, "Fish Recognition Based On Robust Features Extraction From Size And Shape Measurements Using Back-Propagation Classifier," International Review On Computers And Software, Vol. 5, Pp. 489-494, 2010.

[39]   M. K. Alsmadi, K. B. Omar, S. A. Noah, And I. Almarashdeh, "Fish Recognition Based On Robust Features Extraction From Size And Shape Measurements Using Neural Network," Journal Of Computer Science, Vol. 6, P. 1088, 2010.

[40]   M. K. S. Alsmadi, K. B. Omar, S. A. Noah, And I. Almarashdah, "Fish Recognition Based On The Combination Between Robust Feature Selection, Image Segmentation And Geometrical Parameter Techniques Using Artificial Neural Network And Decision Tree," Arxiv Preprint Arxiv:0912.0986, 2009.

[41]   M. K. S. Alsmadi, K. B. Omar, And S. A. Noah, "Back Propagation Algorithm: The Best Algorithm Among The Multi-Layer Perceptron Algorithm," International Journal Of Computer Science And Network Security, Vol. 9, Pp. 378-383, 2009.

[42]   M. Alsmadi, K. Omar, S. Noah, I. Almarashdeh, S. Al-Omari, P. Sumari, S. Al-Taweel, A. Husain, N. Al-Milli, And M. Alsmadi, "Fish Recognition Based On Robust Features Extraction From Size And Shape Measurements Using Neural Network," Information Technology Journal, Vol. 10, Pp. 427-434, 2009.

[43]   T. H. Farag, W. A. Hassan, H. A. Ayad, A. S. Albahussain, U. A. Badawi, And M. K. Alsmadi, "Extended Absolute Fuzzy Connectedness Segmentation Algorithm Utilizing Region And Boundary-Based Information," Arabian Journal For Science And Engineering, Pp. 1-11, 2017.

[44]   M. K. Alsmadi, "A Hybrid Fuzzy C-Means And Neutrosophic For Jaw Lesions Segmentation," Ain Shams Engineering Journal.

[45]   U. A. Badawi And M. K. S. Alsmadi, "A Hybrid Memetic Algorithm (Genetic Algorithm And Great Deluge Local Search) With Back-Propagation Classifier For Fish Recognition " International Journal Of Computer Science Issues, Vol. 10, Pp. 348-356, 2013.

[46]   A. M, O. K, And N. S, "Back Propagation Algorithm : The Best Algorithm Among The Multi-Layer Perceptron Algorithm," International Journal Of Computer Science And Network Security, Vol. 9, Pp. 378-383, 2009.

[47]   M. Sharma, G. Purohit, And S. Mukherjee, "Information Retrieves From Brain Mri Images For Tumor Detection Using Hybrid Technique K-Means And Artificial Neural Network (Kmann)," In Networking Communication And Data Knowledge Engineering, Ed: Springer, 2018, Pp. 145-157.

[48]   Y. Gao, X. Li, M. Dong, And H.-P. Li, "An Enhanced Artificial Bee Colony Optimizer And Its Application To Multi-Level Threshold Image Segmentation," Journal Of Central South University, Vol. 25, Pp. 107-120, 2018.

[49]   M. K. Alsmadi, "A Hybrid Firefly Algorithm With Fuzzy-C Mean Algorithm For Mri Brain Segmentation," American Journal Of Applied Sciences, Vol. 11, Pp. 1676-1691, 2014.

[50]   M. K. Alsmadi, "Mri Brain Segmentation Using A Hybrid Artificial Bee Colony Algorithm With Fuzzy-C Mean Algorithm," Journal Of Applied Sciences, Vol. 15, P. 100, 2015.

[51]   M. K. Alsmadi, "A Hybrid Fuzzy C-Means And Neutrosophic For Jaw Lesions Segmentation," Ain Shams Engineering Journal, 2017.

[52]   S. H. Park And K. Han, "Methodologic Guide For Evaluating Clinical Performance And Effect Of Artificial Intelligence Technology For Medical Diagnosis And Prediction," Radiology, P. 171920, 2018.

[53]   D. S. Kermany, M. Goldbaum, W. Cai, C. C. Valentim, H. Liang, S. L. Baxter, A. Mckeown, G. Yang, X. Wu, And F. Yan, "Identifying Medical Diagnoses And Treatable Diseases By Image-Based Deep Learning," Cell, Vol. 172, Pp. 1122-1131. E9, 2018.

[54]   I. Almarashdeh, "Sharing Instructors Experience Of Learning Management System: A Technology Perspective Of User Satisfaction In Distance Learning Course," Computers In Human Behavior, Vol. 63, Pp. 249-255, 2016.

[55]   I. Almarashdeh, "An Overview Of Technology Evolution: Investigating The Factors Influencing Non-Bitcoins Users To Adopt Bitcoins As Online Payment Transaction Method," Journal Of Theoretical And Applied Information Technology, Vol. 96, 2018.

[56] I. Almarashdeh, "The Important Of Service Quality And The Trust In Technology On Users Perspectives To Continues Use Of Mobile Services," Journal Of Theoretical & Applied Information Technology, Vol. 96, 2018.

[57] I. Almarashdeh And M. Alsmadi, "Investigating The Acceptance Of Technology In Distance Learning Program," In Information Science And Communications Technologies (Icisct), International Conference On, Tashkent Uzbekistan 2016, Pp. 1-5.

[58] I. Almarashdeh And M. Alsmadi, "Heuristic Evaluation Of Mobile Government Portal Services: An Experts' Review," In 11th International Conference For Internet Technology And Secured Transactions (Icitst), 2016, Pp. 427-431.

[59] I. Almarashdeh And M. K. Alsmadi, "How To Make Them Use It? Citizens Acceptance Of M-Government," Applied Computing And Informatics, Vol. 13, Pp. 194-199, 2017/07/01/ 2017.

[60] I. Almarashdeh And M. K. Alsmadi, "Applied Computing And Informatics," 2017.

[61] I. Almarashdeh, A. Althunibat, And N. F. Elias, "Developing A Mobile Portal Prototype For E-Government Services," Journal Of Applied Sciences, Vol. 14, Pp. 791-797, 2014.

[62] I. Almarashdeh, A. Althunibat, N. Fazidah Elias, A. Adewumi, A. Al Thunibat, N. Zin, N. Ashaari, A. Al Thunibat, N. Zin, And N. Sahari, "E-Government For Mobile Societies-Stocktaking Of Current Trends And Initiatives," Journal Of Applied Sciences, Vol. 14, Pp. 104-111, 2013.

[63] I. Almarashdeh, N. F. Elias, N. Sahari, And N. Zain, "Development Of An Interactive Learning Management System For Malaysian Distance Learning Institutions," Middle East Journal Of Scientific Research, Vol. 14, Pp. 1471-1479, 2013.

[64] I. Almarashdeh, G. M. Jaradat, M. Ayob, A. Abu-Al-Aish, And M. Alsmadi, "An Elite Pool-Based Big Bang-Big Crunch Metaheuristic For Data Clustering," Journal Of Computer Science, 2018.

[65] I. Almarashdeh, N. Sahari, And N. Mat Zin, "Heuristic Evaluation Of Distance Learning Management System Interface," Presented At The International Conference On Electrical Engineering And Informatics Bandung, Indonesia 2011.

[66] I. Almarashdeh, N. Sahari, N. M. Zin, And M. Alsmadi, "Instructors Acceptance Of Distance Learning Management System," In International Symposium On Information Technology 2010 (Itsim 2010), Kuala Lumpur, 2010, Pp. 1-6.

[67] I. A. Almarashdeh, N. Sahari, N. A. H. M. Zin, And M. Alsmadi, "Distance Learners Acceptance Of Learning Management System," In 2nd International Conference On Data Mining And Intelligent Information Technology Applications (Icmia2010), Seoul, Korea, 2010, Pp. 304-309.

[68] I. A. Almarashdeh, N. Sahari, N. A. H. M. Zin, And M. Alsmadi, "Distance Learning Management System Requirements From Student's Perspective," The International Journal Of Theoretical And Applied Information Technology, Vol. 24, 2011.

[69] I. A. Almarashdeh, N. Sahari, And N. A. M. Zin, "Heuristic Evaluation Of Distance Learning Management System Interface," In Electrical Engineering And Informatics (Iceei), 2011 International Conference On, 2011, Pp. 1-6.

[70] I. A. Almarashdeh, N. Sahari, N. A. M. Zin, And M. Alsmad, "The Success Of Learning Management System Among Distance Learners In Malaysian Universitie," Journal Of Theoretical And Applied Information Technology, Vol. 21 Pp. 80-91, 2010.

[71] I. A. Almarashdeh, N. Sahari, N. A. M. Zin, And M. Alsmadi, "The Success Of Learning Management System Among Distance Learners In Malaysian Universities," Journal Of Theoretical & Applied Information Technology, Vol. 21, 2010.

[72] I. A. Almarashdeh, N. Sahari, N. A. M. Zin, And M. Alsmadi, "Acceptance Of Learning Management System: A Comparison Between Distance Learners And Instructors," Advances In Information Sciences And Service Sciences, Vol. 3, Pp. 1-9, 2011.

[73] I. A. E. Almarashdeh, "Study Of The Usability Of Learning Management System Tool (Learning Care) Of Postgraduate Students In University Utara Malaysia (Uum)," Graduate School, Universiti Utara Malaysia, 2007.

[74] I. A. Almrashdah, N. Sahari, N. A. H. M. Zin, And M. Alsmadi, "Distance Learners Acceptance Of Learning Management System," In Advanced Information Management And Service (Ims), 2010 6th International Conference On, 2010, Pp. 304-309.

[75] I. A. Almrashdah, N. Sahari, N. A. H. M. Zin, And M. Alsmadi, "Instructors Acceptance Of Distance Learning Management System," In Information Technology (Itsim), 2010 International Symposium In, 2010, Pp. 1-6.

[76] I. A. Almrashdeh, N. Sahari, N. A. M. Zin, And M. Alsmadi, "Distance Learning Management System Reqiurements From Student's Perspective," Journal Of Theoretical & Applied Information Technology, Vol. 24, 2011.

[77] I. A. Almrashdeh, N. Sahari, N. A. M. Zin, And M. Alsmadi, "Instructor's Success Measures Of Learning Management System," In Electrical Engineering And Informatics (Iceei), 2011 International Conference On, 2011, Pp. 1-7.

[78] M. K. A. Ibrahim Almarashdeh, Ghaith Jaradat, Ahmad Althunibat, Sami Abdullah Albahussain, Yousef Qawqzeh, Usama A Badawi, Tamer Farag, "Looking Inside And Outside The System: Examining The Factors Influencing Distance Learners Satisfaction In Learning Management System," Journal Of Computer Science, Vol. 14, Pp. 453-465, 2018.

[79] G. Jaradat, M. Ayob, And I. Almarashdeh, "The Effect Of Elite Pool In Hybrid Population-Based Meta-Heuristics For Solving Combinatorial Optimization Problems," Applied Soft Computing, Vol. 44, Pp. 45-56, 2016.

[80] G. M. Jaradat, A. Al-Badareen, M. Ayob, M. Al-Smadi, I. Al-Marashdeh, M. Ash-Shuqran, And E. Al-Odat, "Hybrid Elitist-Ant System For Nurse-Rostering Problem," Journal Of King Saud University-Computer And Information Sciences, 2018.

[81] M. Rasmi, M. B. Alazzam, M. K. Alsmadi, I. A. Almarashdeh, R. A. Alkhasawneh, And S. Alsmadi, "Healthcare Professionals' Acceptance Electronic Health Records System: Critical Literature Review (Jordan Case Study)," International Journal Of Healthcare Management, Pp. 1-13, 2018.

[82] M. K. Alsmadi, "Forecasting River Flow In The Usa Using A Hybrid Metaheuristic Algorithm With Back-Propagation Algorithm," Scientific Journal Of King Faisal University (Basic And Applied Sciences), Vol. 18, Pp. 13-24, 2017.

[83] J. Adeyemo, O. Oyebode, And D. Stretch, "River Flow Forecasting Using An Improved Artificial Neural Network," In Evolve-A Bridge Between Probability, Set Oriented Numerics, And Evolutionary Computation Vi, Ed: Springer, 2018, Pp. 179-193.

[84] A. Ahani, M. Shourian, And P. R. Rad, "Performance Assessment Of The Linear, Nonlinear And Nonparametric Data Driven Models In River Flow Forecasting," Water Resources Management, Pp. 1-17, 2018.

[85] E. Ferri, "The Evolving Practice Of Complaint Management," Bloomberg Law, Pp. 1-8, 2018.

[86] K. Bala, M. Kumar, S. Hulawale, And S. Pandita, "Chat-Bot For College Management System Using Ai," International Research Journal Of Engineering And Technology, 2017.

[87] S. I. Bello, R. O. Bello, A. O. Babatunde, M. Olugbebi, And B. O. Bello, "A University Examination Web Application Based On Linear-Sequential Life Cycle Model," 2017.

[88] I. Almarashde, A. Althunibat, And N. Fazidah El, "Developing A Mobile Portal Prototype For E-Government Services," Journal Of Applied Sciences, Vol. 14, Pp. 791-797, 2014.

[89] D. Rajagopal And K. Thilakavalli, "A Study: Uml For Ooa And Ood," International Journal Of Knowledge Content Development & Technology, Vol. 7, Pp. 5-20, 2017.

[90] N. A. Nora Alsubaie, Eman Alradwan, Fatima Al-Hazza, Mutasem Alsmadi, Ibrahim Al-Marashdeh, Usama A Badawi, Muneerah Alshabanah, Daniah Alrajhi, Sanaa Alsmadi, Mohammed Tayfour., "Analyzing And Implementing An Online Metro Reservation System," International Journal Of Applied Engineering Research, Vol. 13, Pp. 9198-9206, 2018.