Ali A. Al-yousef

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Dept. of Computer science
Jerash University
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Key Skills

Proficient or familiar with a vast array of programming languages, concepts and technologies, including:

1- SPSS
2- Java
3- C
4- Microsoft office
5- Windows
6- Database (SQL)
7- C++
8- MATLAB
9- python

Education

2010 to 2013	**Doctor of Philosophy in Computer Science** Lincoln university, New Zealand
2003 to 2005	**Master in Computer Information Systems (September 2005)** Yarmuk University, Jordan
1997 to 2001	**Bachelor in Computer Science** Mu'tah University

Work Experience

Jerash University /Jordan

Assistant professor in Computer Science 2013-now

Jerash University /Jordan

Chair for Computer Center	2016-2017

Member at Centre for Advanced Computational Solutions/New Zealand

Research Assistant 2011-now

Al Balqa Applied University/Jordan

Lecturer in Computer Information Technology Department **2002-2009**

Al-Huson Technical College, Al Balqa Applied University
Head of Information Technology Department **2005-2006**

Research interest

Data mining (Clustering and Classification algorithms), Medical data analysis, bioinformatics, Artificial neural network, social data analysis. big data analysis.

Research statement

Since 2013 I have been an assistant professor in Jerash University Department of Computer Science. My training is in machine learning and artificial intelligence (Ph.D. in Computer Science, Lincoln University, 2013). I design machine learning framework for early detection of breast cancer. I have also done research in computational models of big data analysis. Primarily I am interested in bringing knowledge about human genes as well as knowledge about molecular biology of human to bear on the task of computational modeling and algorithm design in the domain of diagnosis, prognosis and treatment. My primary interest is in the data mining (supervised and unsupervised) and my main research focus is in the areas of big data analysis specially biological and medical data.

Previous works:

During the last decade I published several article including conferences, journals and book chapter including:

Improved Ultrasound based computer aided diagnosis of breast cancer: evaluation of a new feature of mass central regularity degree [1,2] In order to enhance diagnostic accuracy of breast cancer, computer aided diagnosis (CAD) systems have been built. Ultrasound is one of the most frequently used methods for early detection of breast cancer. Currently, the accuracy of CAD systems based on ultrasound images is about 90% and needs further enhancement in order to save lives of the undetected. A meaningful approach to do this is to explore new and meaningful features with discriminating ability and incorporate them into CAD systems. Recently, from a thorough investigation of the images, we extracted a new geometric feature related to the mass shape in ultrasound images called Central Regularity Degree (CRD). The CRD reflects the degree of regularity of the middle part of the mass. To demonstrate the effect of CRD on differentiating malignant from benign masses and the potential improvement to the diagnostic accuracy of breast cancer using ultrasound, this study evaluated the diagnostic accuracy of different classifiers when the CRD was added to five powerful mass features

obtained from previous studies including one geometric feature: Depth-Width ratio (DW); two morphological features: shape and margin; blood flow and age. Artificial Neural Networks (ANN), K Nearest Neighbour (KNN), Nearest Centroid, Linear Discriminant Analysis (LDA), and Receiver Operating Characteristic (ROC) analysis were employed for classification and evaluation. Ninety nine breast sonograms- 46 malignant and 53 benign- were evaluated. The results reveal that CRD is an effective feature discriminating between malignant and benign cases leading to improved accuracy of diagnosis of breast cancer. The best results were obtained by ANN where the area under ROC curve (Az) for training and testing using all features except CRD was 100% and 81.8%, respectively, and 100% and 95.45% using all features. Therefore, the overall improvement by adding CRD was about 14%, a significant improvement.

Gene expression based Computer Aided diagnostic system for Breast Cancer: A novel biological filter for biomarker detection[3] analysing microarray data is challenged by the high-dimensionality of the data compared with the number of samples. The aim of this study was to enhance the diagnostic accuracy of Breast Cancer Computer Aided Diagnostic Systems (CADs) that use gene expression profiling of peripheral blood cells, by introducing a novel feature selection method called Bi-biological filter that was further refined by Best First Search with Support Vector Machines SVM (BFS-SVM) to select a small set of the most effective genes predictive of breast cancer. From each patient's gene expression profiles, a gene co-expression network was built and divided into functional groups or clusters using Topological Overlap Matrix (TOM) and Spectral Clustering (SC) in the design of the Bi-Biological filter to obtain the preliminary set of gene markers. BFSSVM was used to further filter a smaller set of best gene markers, and Artificial Neural Networks (ANN), SVM and Linear Discriminant Analysis (LDA) were used to assess their classification performance. The study used 121 samples – 67 malignant and 54 benign cases as input to for the system. The Bi-biological filter selected 415 genes as mRNA biomarkers and BFS-SVM was able to select just 13 out of 415 genes for classification of breast cancer. ANN was found to be the superior classifier with 93.4% classificationaccuracy which was a 14% improvement over the past best CAD system.

Skin microneedling for acne scars associated with pigmentation in patients with dark skin [4]

This study especially focus on the treatment of pigmented post acne scarring using skin microneedling. Aims: The primary objective is to assess the improvement of pigmentation of acne scarring in patients with dark skin using microneedling. Secondary objectives include evaluation of post acne scarring improvement and the safety of microneedling in pigmented skin. Materials & methods: 39 Patients with darker skin colors (types 3, 4 and 5) completed study. Baseline evaluation for both acne scars and pigmentation scores performed using "post acne hyperpigmentation index" (PAHPI) and Goodman-Baron scales (GB scale). Microneedling treatment done and subsequently patients reviewed at 2 weeks for initial assessment and then after at least 4 weeks from date of initial assessment using same scoring methods for both scars and pigmentation. Baseline photographs were taken and again at final assessment. Results: Both PAHPI and Goodman-Baron scales showed statistically significant improvement from baseline following microneedling treatment. Side effects were minor and of transient nature. None of our patients showed worsening of pigmentation. Conclusion: Microneedling is an effective treatment for both acne scars and associated pigmentation in patients with dark skin

color. The treatment appears to be safe apart from transient redness, mild dryness, and small hematomas, however additional treatments may be needed in some patients to achieve more improvement in pigmentation.

Vitamin D and ferritin correlation with chronic neck pain using standard statistics and a novel artificial neural network prediction model [5]

Here, we aimed to determine if Ferritin and Vitamin D are modifiable risk factors with chronic neck pain using slandered statistics and artificial intelligence neural network (ANN). Methods: Fifty-four patients with chronic neck pain treated between February 2016 and August 2016 in King Abdullah University Hospital and 54 patients age matched controls undergoing outpatient or minor procedures were enrolled. Patients and control demographic parameters, height, weight and single measurement of serum vitamin D, Vitamin B12, ferritin, calcium, phosphorus, zinc were obtained. An ANN prediction model was developed. Results: The statistical analysis reveals that patients with chronic neck pain have significantly lower serum Vitamin D and Ferritin (p-value <.05). 90% of patients with chronic neck pain were females. Multilayer Feed Forward Neural Network with Back Propagation(MFFNN) prediction model were developed and designed based on vitamin D and ferritin as input variables and CNP as output. The ANN model output results show that, 92 out of 108 samples were correctly classified with 85% classification accuracy. Conclusions: Although Iron and vitamin D deficiency cannot be isolated as the sole risk factors of chronic neck pain, they should be considered as two modifiable risk. The high prevalence of chronic neck pain, hypovitaminosis D and low ferritin amongst women is of concern. Bioinformatics predictions with artificial neural network can be of future benefit in classification and prediction models for chronic neck pain. We hope this initial work will encourage a future larger cohort study addressing vitamin D and iron correction as modifiable factors and the application of artificial intelligence models in clinical practice.

Current works:

Predicting Treatment Outcome of Spinal Musculoskeletal Pain Using a Novel Medical artificial intelligence Model: A Pilot Study

Objectives: Musculoskeletal pain is a heterogenous condition with multiple risk factors, primary sources that can affect treatment and rehabilitation outcome. Identification of clinical predictors for good outcome can help subgrouping patients to best treatment and rehabilitation approach. The current paper proposes the integration of applications based on machine learning such as artificial neural networks (ANN) to therapeutic subgrouping of musculoskeletal pain according to best predicting factors (clinical, demographic, and biomarker variables). computer-assisted machine learning utilized to build a pilot intelligent prediction model of ANN-based muscle trigger points response. Patients and Methods: A quasi-experimental, pre-post intervention, study design on 27 patients aged 18-60 years with neck/shoulder pain. Patients received a single injection (0.2 ml) of 0.5% lidocaine at the trigger points. Pre-treatment visual analog scale (VAS), clinical and serological variables, Statistical analysis was used for preliminary exploration of the influence of pre-treatment variables on the treatment outcome (VAS). This led to the development of an ANN model for predicting treatment outcome based on influential pre-treatment variables as inputs. Owing to the small sample size, the Leave One Out Cross Validation (LOOCV) method was used to validate the ANN model. we used more variables as inputs to take advantage of the powerful nonlinear processing of ANN. The strength of each predicting variable was tested using Multilayer Feed Forward Neural Network with Back Propagation (MFFNN) with LOOCV. Then, the MFFNN prediction model was developed and

designed based on the selected variables.

Mammography based breast cancer computer aided diagnosis using classifier fusion

Microcalcifications and masses are two important finding of the breast mammography. Those findings are classified into two types malignant or benign. But, for radiologist still the specificity is low and about 85% of breast biopsy are done for benign cases [7]. In order to enhance the diagnostic accuracy of the mammography imaging computer aided diagnosis system were developed. Different classification algorithms have been used in this area such as Fuzzy logic, genetic algorithms [8] Bayesian networks [9]. Multilayer Perceptron (MLP) Neural Network, Linear Discriminant Analysis (LDA), Support Vector Machines (SVM), Least-Squares Minimum Distance and k-Nearest Neighbor (k-NN) [10] [11] [12] Artificial neural networks for early detection. The deference between CAD systems based on mammography is not only in classifiers but also in the features used for classification. Deferent types of features are used for early detection of breast cancer. For example, arrangement and variation of intensities (gray values) within mammogram image are used [13-15]. Also, Georgiou et al. [16] and Baeg et al. [17] studied the predictive power of the mass features such as shape and boundary. Also, Chan et al. [18] compare the results of using: textural features, morphological features and the combination of both texture and morphological features. The study found that the texture features are more accurate in early detection of breast cancer than morphological features, while the highest accuracy was obtained from the combination of both features.

The aim of this study is to enhance the diagnostic accuracy of breast cancer in order to save more live. This can be done by minimizing the number of misclassified instances. To do that, this paper combined the results of different classifiers using a voting classifier fusion method

Circulating miRNA gene expression in the serum for breast cancer biomarker detection and classification

Background:Cancer produces complex cellular changes. Many tumour types have been analysed by miRNA profiling and each has shown differing miRNA profiles when compared with normal cells from the same tissue. Microarrays have become crucial to identifying genes involved in causing these changes. However, microarray data analysis is challenged by high-dimensionality of data compared with the number of samples. This work has contributed to detecting the circulating breast cancer miRNA biomarkers by analyzing the expression of miRNA genes extracted from 56 samples (32 with breast cancer, 24 control) using the Bi-biological filter[3]

Results: By applying the Bi-biological filter for feature selection, 8 groups of genes were found to be shared between the groups of the two cancer subsets and only one out of the 8 clusters were shared with the healthy groups.The total number of genes in the selected seven groups was 74 genes. Best First Search and SVM with 5-fold out cross validation wrapper was used to select a subset of seven genes from the 74 selected genes as potential biomarkers. Four classifiers, MFFNN, SVM, LDA and KNN with 5-fold out cross validation were used to validate the accuracy of the selected genes based on sensitivity, specificity, FP, FN and accuracy measures.The SVM was the superior classifier with 98.2% classification accuracy.

Conclusion: The overall improvement by using this novel feature selection method was about 7%, which is a significant improvement, compared with the current best circulating miRNA based BC-CAD systems.

Future work:

In the next two years I am planning to start a project in breast cancer gene therapy by using NGS and data mining to select a subset of genes related to breast cancer but this project needs heaps of money about (500000$). So I am planning to write the proposal and apply for a found.

1. *A. Al-yousef, S. Samarasinghe ,"Ultrasound based computer aided diagnosis of breast cancer: Evaluation of a new feature of mass central regularity degree*", 19th International Congress on Modelling and Simulation, Perth, Australia, 12–16 December 2011 http://mssanz.org.au/modsim2011

2. *A. Al-yousef, S. Samarasinghe," Improved Ultrasound Based Computer Aided Diagnosis System for Breast Cancer Incorporating a New Feature of Mass Central Regularity Degree (CRD), in: Artificial Neural Network Modelling , Springer International Publishing 2016, doi.org/10.1007/978-3-319-28495-8_10.*

3 *A. Al-yousef, S. Samarasinghe, and D. Kulasiri, "Gene expression based computer aided diagnostic system for breast cancer: a novel biological filter for biomarker detection," in MODSIM 2013, 20th International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, 2013, pp. 663-669.*

4. Al Qarqaz, F. and A. Al-Yousef, *Skin microneedling for acne scars associated with pigmentation in patients with dark skin.* J Cosmet Dermatol, 2018. **17**(3): p. 390-395.

5. Eloqayli, H., A. Al-Yousef, and R. Jaradat, *Vitamin D and ferritin correlation with chronic neck pain using standard statistics and a novel artificial neural network prediction model.* Br J Neurosurg, 2018. **32**(2): p. 172-176

6. *Breast Mass Lesions: Computer aided Diagnosis Models with a mammographic and Sonographic Descriptors1*

8. Lee, Y.B. and D.Y. Tsai, *Computerized classification of microcalcifications on mammograms using fuzzy logic and genetic algorithm*, in *Medical Imaging 2004: Image Processing, Pts 1-3*, J.M. Fitzpatrick and M. Sonka, Editors. 2004, Spie-Int Soc Optical Engineering: Bellingham. p. 952-959.

9. Cruz-Ramírez, N., et al., *Diagnosis of breast cancer using Bayesian networks: A case study*. Computers in Biology and Medicine, 2007. **37**(11): p. 1553-1564.

10. Tourassi, G.D., et al., *Evaluation of information-theoretic similarity measures for content-based retrieval and detection of masses in mammograms.* Medical Physics, 2007. **34**(1): p. 140-150.

11. Karabatak, M. and M.C. Ince, *An expert system for detection of breast cancer based on association rules and neural network.* Expert Systems with Applications, 2009. **36**(2, Part 2): p. 3465-3469.

12. Verma, B., P. McLeod, and A. Klevansky, *A novel soft cluster neural network for the classification of suspicious areas in digital mammograms.* Pattern Recognition, 2009. **42**(9): p. 1845-1852.

13. Chan, H.P., et al., *Computerized classification of malignant and benign microcalcifications on mammograms: Texture analysis using an artificial neural network.* Physics in Medicine and Biology, 1997. **42**(3): p. 549-567.

14. Papadopoulos, A., D.I. Fotiadis, and A. Likas, *Characterization of clustered microcalcifications in digitized mammograms using neural networks and support vector machines.* Artificial Intelligence in Medicine, 2005. **34**(2): p. 141-150.

15. Manduca, A., et al., *Texture Features from Mammographic Images and Risk of Breast Cancer.* Cancer Epidemiology Biomarkers & Prevention, 2009. **18**(3): p. 837-845.

16. Georgiou, H., et al., *Multi-scaled morphological features for the characterization of mammographic masses using statistical classification schemes.* Artificial Intelligence in Medicine, 2007. **41**(1): p. 39-55.

17. Baeg, S., et al., *Segmentation of mammograms into distinct morphological texture regions.* 11th Ieee Symposium on Computer-Based Medical Systems, Proceedings. 1998, Los Alamitos: Ieee Computer Soc. 20-25.

18. Chan, H.P., et al., *Computerized analysis of mammographic microcalcifications in morphological and texture feature spaces.* Medical Physics, 1998. **25**(10): p. 2007-2019.

Publications /Conferences and workshops

1- Obeidat A.A., Gubarev V.V**., Al-yousef A.A**. **Decentralized and Fair Mutual Exclusion Protocol in Peer-to-Peer Systems**. The 10th International Workshop on Computer Science and Information Technologies (CSIT), Antalya, Turkey, Ufa State Aviation Technical University, 2008. — P. 11–16.

2- **Ali Al-yousef**, Sandhya Samarasinghe**. Ultrasound based computer aided diagnosis of breast cancer: Evaluation of a new feature of mass central regularity degree.** 19th International Congress on Modelling and Simulation, Perth, Australia, 12–16 December 2011.

3- Ali Al-yousef, Sandhya Samarasinghe. **Gene expression based Computer Aided diagnostic system for Breast Cancer: A novel biological filter for biomarker detection.** 20th International Congress on Modelling and Simulation, Adelaide, Australia, 1–6 December 2013.

Publications /Journals and Book Chapters

4- Ali Al-Yousef, , Sandhya Samarasinghe**, Improved Ultrasound Based Computer Aided Diagnosis System for Breast Cancer Incorporating a New Feature of Mass Central Regularity Degree (CRD).** Book Chapter, Artificial Neural Network Modelling, Volume 628 of the series Studies in Computational Intelligence pp 213-233, Springer 2016.

5-Firas Al Qarqaz , **Ali Al yousef ,Skin microneedling for acne scars associated with pigmentation in patients with dark skin.** J Cosmet Dermatol. 2018 Jun;17(3):390-395. doi:

10.1111/jocd.12520. Epub 2018 Mar 15.

6- Haytham Eloqayli, **Ali Al-Yousef** & Raid Jaradat, **Vitamin D and ferritin correlation with chronic neck pain using standard statistics and a novel artificial neural network prediction model**, British Journal of Neurosurgery,**Published Online:** 15 Feb 2018

7- RAMI MALKAWI, MALEK ALZAQEBAH, **ALI. AL-YOUSEF**, BILAL ABUL-HUDA, **The impact of digital storytelling rubrics on social media engagements,** International Journal of Computer Applications in Technology 2018

In progress research:

1-Mammography based Computer Aided diagnosis of breast cancer: Combining both microcalcification and mass features (almost done) .

2- Gene expression based Computer Aided diagnostic system for Breast Cancer: A novel biological filter for biomarker detection (first draft).

3- miRNA based Computer Aided Diagnostic system for early detection of breast cancer in Jordanian women (first draft)..

4- Therapeutic response prediction for neck and radicular pain based on a novel application of an artificial neural network prediction model (submitted BMC)

Funding and support

1-Reaseach Scholar (Jerash university). $400. 2103-2014.

2- Research Scholar (Jerash university). $1200. 2107-2018.

Reviewer & Additional Reviewer

1- International Congress on Modelling and Simulation(MODSIM2017). 2017

2- International Congress on Modelling and Simulation(MODSIM2015). 2015

Teaching and course development

Teaching interest:

Data mining, Artificial Intelligence, Algorithms, Data structure and Bioinformatics.

Course Development & Revision:

An comprehensive revision of each of the following courses was made. Each course was standardized and adjusted with its prerequisites to fit into the new undergraduate catalog:

- Data mining

- Artificial Intelligence

- Algorithms

Courses taught:

1- Artificial intelligence
2- System analysis and design
3- Data structure
4- Artificial intelligence
5- Data mining
6- Algorithm
7- Essentials of bioinformatics
8- Database (SQL) MATLAB

Teaching philosophy

My teaching philosophy has developed from my personal and professional experience. In 1997, I left high school prematurely and began my university education. During my four years obtaining bachelor's degree (computer science), I met dozens of professors in multiple disciplines. Some were great public speakers, some were highly systematized, and some showed confidence and knowledge. Some communicated infectious enthusiasm, some stimulated group projects, and some used technology to recognize the different learning modes of students. During this period I learned how I can start my teaching well. Also, they taught me that it was more imperative to teach than to merely instruct. In 2002 after I completed my BSc study, I worked as a full time lecturer, for seven years, in Al-Balqa Applied University until 2009. During that time I learned the real meaning of encouraging and its effect on the student's performances. After that I moved to New Zealand to complete PhD in computer science and accrue new experiences in teaching methodologies.

My teaching philosophy focuses on three aspects. The first one is before class, this aspect includes; preparing the materials that suits the class subject such as worksheets, presentation and examples, and uploading the class material online to let a student have a look before the class. The second one is during the class. Our mission here is to make a communication channel between me and my students that give a student confidence, relaxation and flexibility give his/her opinions. I believe in encouraging people for success by abridging their trip to achieve the right skills. For computer science undergraduate students, that encouragement come from being able to create things they imagine being used in the real world and being able to think about themselves as promising contributors to society. For this purpose it is good sometime to talk about relevant personal experience. Several studding tools maybe used in the class depends on the class objective including;

digital presentation (pptx), whiteboard, smartboard, PC and mobile. The last aspect of my teaching philosophy is after class; here my focus is on following up the student performances through the office hours and the online assignments.

I have found that I am able to combine my enthusiasm for computing and my love for guiding people to find their own answers. I enjoy helping others to understand that technology is for them to use as a tool, instead of having to struggle to find a way around it.

References

The first one	
Name	Sandhya Samarisainge
Position	Associated professor at Lincoln University**. Also she was the supervisor of my Ph.D research.**
Address	Lincoln University, Lincoln, Canterbury, New Zealand. Tel: +64 3 325 3838 Or +64 3 325 3845.

The second one:	
Name	Don Kulasiri
Position	Full professor at Lincoln University**. Also he was the co-supervisor of my Ph.D research.**
Address	Lincoln University, Lincoln, Canterbury, New Zealand. Tel: +64 3 325 3838 Or +64 3 325 3845.

The third	
Name	Mohammad Abo Shuqrier
Position	Associated professor at Jerash University
Address	Jreash University, Jerash, Ammad-Irbid motorway , Jordan. Tel: 00962779830983

Languages

Arabic (native) **English** (fluent)