BIOGRAPHICAL SKETCH

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NAME: Pahlavan Tafti, Ahmad

eRA COMMONS USER NAME (credential, e.g., agency login): pahlavaa

POSITION TITLE: Associate Research Scientist

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Marshfield Clinic Research Institute, USA	Postdoc	05/2017	Biomedical Informatics
University of Wisconsin-Milwaukee, USA	Ph.D.	05/2016	Computer Science
Azad University, Iran and UAE	M.Sc.	09/2011	Computer Science
Azad University, Iran	B.S.	09/1998	Computer Science
Coursera (Online), Johns Hopkins University, USA	Certificate	2016	Practical Machine Learning
Coursera (Online), Stanford University, USA	Certificate	2015	Machine Learning
Coursera (Online), Johns Hopkins University, USA	Certificate	2015	R Programming
Technical University of Vienna, Austria	Certificate	2012	Medical Image Analysis
Oracle Education Center, Malaysia	Certificate	2001	Database Management

A. Personal Statement

I am an Associate Research Scientist with deep passion for improving health informatics with better patient diagnosis and treatment using big and multiple data sources and novel computational algorithms. I earned my PhD in Computer Science from University of Wisconsin-Milwaukee and since then, I have been on a quest to explore and solve problems that are “worth it” and make the most positive impact on people’s lives. In my current position in Biomedical Informatics Research Center at Marshfield Clinic Research Institute, I have successfully leveraged my background in machine learning modeling, text analytics, computational vision, algorithm design and big data analytics to find solutions to a diverse range of problems in biomedical and health informatics. I am passionate about diverse biomedical data, machine intelligence and its applications in healthcare. I played a key role in the development and enhancement of an integrated big data analytics framework within the Marshfield Clinic Research Institute, particularly for adverse drug events (ADEs) analyses from big data biomedical literature and health-related social media. I have extensive research experience in conducting computational mechanisms with a key focus on machine learning and deep learning strategies.

- **Tafti AP**, Assefi M, LaRose E, Badger J, Shimpi N, Bashiri F, Shaghb E, McLean H, Page D, Peissig P. ***Big data deep neural network to analyze adverse vaccine reactions***. AMIA 2018 Informatics Summit. 2018.

- **Tafti AP**, Sagheb E, Omranian S, Schotthoefer A. ***Towards a keyword proximity dictionary of Lyme disease using a neural network word embedding model and cosine similarity.*** In Submission. 2018

- **Tafti AP,** Badger J, LaRose E, Shirzadi E, Mahnke A, Mayer J, Ye Z, Page D, Peissig P. ***Adverse Drug Event Discovery Using Biomedical Literature: A Big Data Neural Network Adventure***. JMIR Medical Informatics. 2017;5(4):e51.

- Wu Y, Fan J, Peissig P, Berg R, **Tafti AP**, Yin J, Yuan M, Page D, Cox J, Burnside ES. ***Quantifying predictive capability of electronic health records for the most harmful breast cancer***. InMedical Imaging 2018: Image Perception, Observer Performance, and Technology Assessment 2018 Mar 7 (Vol. 10577, p. 105770J). International Society for Optics and Photonics.

- **Tafti AP**, Behravesh E, Assefi M, LaRose E, Badger J, Mayer J, Doan A, Page D, Peissig P. ***bigNN: an open-source big data toolkit focused on biomedical sentence classification.*** Big Data (Big Data) 2017 IEEE International Conference on, 2017.

- Mehdi Assefi, Ehsun Behravesh, Guangchi Liu, **Tafti AP**. ***Big data machine learning using apache spark MLlib***, Big Data (Big Data) 2017 IEEE International Conference on, pp. 3492-3498, 2017.

- **Tafti, A.P.**, LaRose, E., Badger, J.C., Kleiman, R. and Peissig, P., 2017, July. ***Machine Learning-as-a-Service and Its Application to Medical Informatics***. In International Conference on Machine Learning and Data Mining in Pattern Recognition (pp. 206-219). Springer, Cham.

- Ye, Z., **Tafti, A.P.**, He, K.Y., Wang, K. and He, M.M., 2016. ***SparkText: Biomedical text mining on big data framework***. PloS one, 11(9), p.e0162721.

B. Positions and Honors

Positions and Employment

2017-Present	Associate Research Scientist, Biomedical Informatics Research Center, Marshfield Clinic Research Institute, USA
2016-2017	Postdoctoral Fellow, Biomedical Informatics Research Center, Marshfield Clinic Research Institute, USA
2013-2016	Graduate Student, Research Assistant/Teaching Assistant, University of Wisconsin-Milwaukee, USA
2012-2013	Director of IT Development & Infrastructure, ASYCUDA Project, Mashhad, Iran
1998-2012	Database Administrator, ASYCUDA Project, Mashhad, Iran

Journal Reviewer

2016-Present	IEEE Journal of Biomedical and Health Informatics, IEEE
2016-Present	International Journal of Rough Sets and Data Analysis, IGI-Global
2016-Present	Micron, Elsevier
2016-Present	Ultramicroscopy, Elsevier
2016-Present	Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, Taylor & Francis.
2015-Present	International Journal of Computer Vision and Image Processing, IGI-Global

Editorial Board Member

2016-Present International Journal of Computer Vision & Signal Processing

Conference Program Committee/Reviewer

2018-Present AMIA Informatics Summit
2016-Present AMIA Annual Symposium
2016-Present AMIA Joint Summit on Translational Science
2016 IEEE International Conference on Big-data, Internet of things, and Zero-size intelligence
2015-Present International Symposium on Visual Computing (ISVC)
2015-Present IEEE International Conference on Artificial Intelligence and Pattern Recognition

Keynote Speaker

2018 The Journey from Machine Learning to Deep Learning, Marquette University, Milwaukee, USA

Workshop Organizer

2017 Big Data Analytics-as-a-Service: Architecture, Algorithms, and Applications in Health Informatics, KDD 2017, Halifax, Canada
2016 Computer Vision-as-a-Service, ISVC 2016, Las Vegas, USA

Professional Memberships

2016-Present Member, AMIA
2014-Present Member, IEEE
2014-Present Member, ACM
2014-Present Member, MSA

Honors and Awards

2017 NVIDIA's Academic GPU Award, NVIDIA
2016 3rd Place, Larry Hause Student Poster Competition, IEEE (with Dr. Ahmadreza Baghaie)
2016 SDIWC Best Reviewer Award
2015 General Electric (GE) Honorable Mention Award, GE
2015 Travel Award, ISVC 2015
2014 Travel Award, ISVC 2014

C. Contributions to Science

1. Adverse drug events discovery using biomedical literature and big data text analytics

The study of adverse drug events (ADEs) is a tenured topic in medical literature. In recent years, increasing numbers of scientific articles and health-related social media posts have been generated and shared daily, albeit with very limited use for ADE study and with little known about the content with respect to ADEs. The aim of this

study was to develop a big data analytics strategy that mines the content of scientific articles and health-related Web-based social media to detect and identify ADEs. We analyzed the following two data sources: (1) biomedical articles and (2) health-related social media blog posts. We developed an intelligent and scalable text mining solution on big data infrastructures composed of Apache Spark, natural language processing, and machine learning. This was combined with an Elasticsearch No-SQL distributed database to explore and visualize ADEs.The accuracy, precision, recall, and area under receiver operating characteristic of the system were 92.7%, 93.6%, 93.0%, and 0.905, respectively, and showed better results in comparison with traditional approaches in the literature. This work not only detected and classified ADE sentences from big data biomedical literature but also scientifically visualized ADE interactions. To the best of our knowledge, this work is the first to investigate a big data machine learning strategy for ADE discovery on massive datasets downloaded from PubMed Central and social media. This contribution illustrates possible capacities in big data biomedical text analysis using advanced computational methods with real-time update from new data published daily.

- **Tafti AP**, Assefi M, LaRose E, Badger J, Shimpi N, Bashiri F, Shaghb E, McLean H, Page D, Peissig P. ***Big data deep neural network to analyze adverse vaccine reactions***. AMIA 2018 Informatics Summit. 2018.

- **Tafti AP,** Badger J, LaRose E, Shirzadi E, Mahnke A, Mayer J, Ye Z, Page D, Peissig P. ***Adverse Drug Event Discovery Using Biomedical Literature: A Big Data Neural Network Adventure***. JMIR Medical Informatics. 2017;5(4):e51.

- **Tafti AP**, Behravesh E, Assefi M, LaRose E, Badger J, Mayer J, Doan A, Page D, Peissig P. ***bigNN: an open-source big data toolkit focused on biomedical sentence classification.*** Big Data (Big Data) 2017 IEEE International Conference on, 2017.

2. Lyme disease keyword proximity analysis using diverse biomedical data sources

Lyme disease is currently the most frequently reported vector-borne disease in the United States. Diagnosis is challenged by the wide range and often non-specific clinical manifestations and terminologies of the disease. Failure to diagnose and treat early often leads to recognized and severe complications, including Lyme arthritis and neuroborreliosis. Although Lyme disease includes a set of standardized, structured, and even inimitable terminology that improves the understanding of the clinical presentation and outcomes of the disease, there is a need to develop a disease keyword proximity dictionary using different biomedical data sources, such as clinical notes, scientific articles, and health-related social media to account for the wide spectrum of clinical interpretations associated with the disease. Among those data sources, the scientific articles published in biomedical literature are usually generated using standardized and principled methods and they are thus especially valuable for the disease keyword discovery. Given the fact it is very costly and time consuming on the human scale to extract the disease terminology from thousands of biomedical articles, we aim to develop a machine learning strategy to automatically extract keyword proximity vocabularies associated to Lyme disease. The current work reports our findings related to text mining of thousands of scientific abstracts published in biomedical research to assist with building a Lyme disease data dictionary for automated medical record abstraction. In near future, we will incorporate clinical narratives to extract keyword proximity dictionary for Lyme disease.

- **Tafti AP**, Sagheb E, Omranian S, Schotthoefer A. ***Towards a keyword proximity dictionary of Lyme disease using a neural network word embedding model and cosine similarity.*** In Submission. 2018

3. SeLibCV: An Easy-to-Use and High Available Service Library for Computer Vision Researchers Worldwide

Computer vision and its underlying algorithms, such as image registration, image segmentation, object localization, object tracking, and 3D surface reconstruction have been around for several years in many scientific disciplines including biomedical, industrial, social, and natural sciences. These highly demanded algorithms still remain underused in small and medium scale research communities, labs, and individual researchers that collectively produce the majority of scientific outcomes. There have been two reasons: (1) Most of the computer vision algorithms are complicated in code, and their implementations are available for only a few platforms, and (2) Local development of computer vision algorithms requires different software and packages, and it also needs too much knowledge. These restrictions raise various difficulties to utilize the computer vision algorithms, and even more, it makes different challenges to establish novel experiments and develop new research ideas. To tackle this problem, we designed and developed an easy-to-use and high available service library for computer vision researchers worldwide called “SeLibCV”. It is a new “delivery model” that provides both human-oriented and application-oriented interfaces for highly demanded computer vision algorithms. The overall objective of the “SeLibCV” is to provide Software as a Service (SaaS) library for computer vision researchers worldwide which is able to facilitate Rapid Application Development (RAD), providing application-to-application interaction by tiny services available on the Internet. All part of the “SeLibCV” services are freely and publicly available for any academic, educational, and research purposes. The “SeLibCV” is freely and publicly available at http://selibcv.org for any academic, research, and educational purposes. This contribution could be potentially considered as a primary step towards Computer Vision as a Service, the next generation of computer vision applications. Using advanced computational technologies an attempt was made to design and develop an easy-to-use and high available service library for computer vision researchers worldwide. The “SeLibCV” is a new delivery model which provides both human-oriented and application-oriented interfaces for highly demanded computer vision algorithms, and it facilitates Rapid Application Development (RAD), and fast prototyping for computer vision applications, leading to reproducible researches by tiny services freely and publicly available on the Internet. The “SeLibCV” includes several invaluable quality attributes as follows:

It is platform independent, so any hardware and/or operating system (e.g., Linux, Windows, and /or OS X) could be used for the “SeLibCV”.
Users do not need to develop several lines of code.
Users do not need to install any specific packages (e.g., Matlab, OpenCV).
Users do not need to be an expert in computer vision area.
Users can easily utilize “SeLibCV” services using any programming languages.
Users can also use “SeLibCV” web based application using only a browser.

The main functionality of the “SeLibCV” covers a wide range of highly demanded computer vision algorithms including image processing, features extraction, object detection, and 3D surface reconstruction. This contribution definitely assists reproducible research for all researchers, students, university professors, and application developers worldwide who want to apply computer vision algorithms in an easy-to-use and multi-platform fashion.

- **Tafti, A.P.**, Hassannia, H., Piziak, D. and Yu, Z., 2015, December. SeLibCV: a service library for computer vision researchers. In International Symposium on Visual Computing (pp. 542-553). Springer, Cham.

- **Tafti, A.P.**, Hassannia, H., Borji, A. and Yu, Z., 2015. Computer Vision as a Service: Towards an Easy-To-Use Platform for Computer Vision Researchers. CVPR.

- **Tafti, A.P.**, Hassannia, H. and Yu, Z., 2015. siftservice. com-Turning a Computer Vision algorithm into a World Wide Web Service. arXiv preprint arXiv:1504.02840.

4. 3D Surface Modeling of Microscopic Images using Computational Vision and Machine Learning

The scanning electron microscope (SEM), as one of the most commonly used instruments in biological and materials sciences, employs electrons instead of light to determine the surface properties of specimens. However, the SEM micrographs still remain 2D images. To effectively measure and visualize the surface attributes, we need to restore the 3D shape model from the SEM images. 3D surface reconstruction is a longstanding topic in microscopy vision as it offers quantitative and visual information for a variety of applications consisting medicine, pharmacology, chemistry, and mechanics. In this research project, an attempt was made to revisit the expanding body of the work, presenting a taxonomy of 3D SEM surface reconstruction approaches. With the present work, I enhanced the reliability, accuracy, and speed of 3D SEM surface reconstruction by designing and developing a novel adaptive, intelligent, and optimized multi-view framework. I then considered several real-world experiments as well as synthetic data to examine the qualitative and quantitative attributes of the proposed framework, and the results have been promising. Furthermore, I provided a 3D microscopy dataset namely “3DSEM” and made it publicly and freely available to the research community (http://selibcv.org/3dsem). The summary of the project includes: (1) An attempt was made to explain the expanding body of 3D SEM surface reconstruction algorithms; (2) I novelly developed an optimized multi-view framework for the 3D SEM surface reconstruction problem; (3) We analyzed the qualitative and quantitative attributes of our proposed framework from different perspectives, and the results are promising; (4) I modeled a taxonomy of 3D SEM surface reconstruction approaches and address several challenging issues as part of the future work in this vast progressing research area; (5) Our contribution provided insights and tendencies, and plans several future enhancements to advance the level of 3D surface reconstruction for SEM images; (6) A 3D microscopy dataset has been publicly and freely provided to the research community for the purpose of reproducible research. This contribution is particularly invaluable to biological and materials scientists and researchers worldwide, in which it assists rotation and depth for further interpretation of microscopic objects, creating realistic anatomic shape in micro scale, so they can truly interpret the surface properties (e.g., compositions or geometries) of microscopic samples. The field of 3D surface modeling of microscopic objects will offer quantitative and visual information for a variety of applications such as medicine, genetic, pharmacology, chemistry, and mechanics.

- **Tafti, A.P.**, Holz, J.D., Baghaie, A., Owen, H.A., He, M.M. and Yu, Z., 2016. 3DSEM++: Adaptive and intelligent 3D SEM surface reconstruction. Micron, 87, pp.33-45.

- **Tafti, A.P.**, Kirkpatrick, A.B., Holz, J.D., Owen, H.A., Yu, Z., 2015, "3DSEM: A Dataset for 3D SEM Surface Reconstruction", doi:10.7910/DVN/HVBW0Q, Harvard Dataverse, V1

- Omrani, E., **Tafti, A.P.**, Fathi, M.F., Moghadam, A.D., Rohatgi, P., D'Souza, R.M. and Yu, Z., 2016. Tribological study in microscale using 3D SEM surface reconstruction. Tribology International, 103, pp.309-315.

- **Tafti, A.P.**, Kirkpatrick, A.B., Alavi, Z., Owen, H.A. and Yu, Z., 2015. Recent advances in 3D SEM surface reconstruction. Micron, 78, pp.54-66.

- **Tafti, A.P.**, Kirkpatrick, A.B., Owen, H.A. and Yu, Z., 2014. 3D Microscopy Vision Using Multiple View Geometry and Differential Evolutionary Approaches. In Advances in Visual Computing (pp. 141-152). Springer International Publishing.

D. Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/53037094/?sort=date&direction=descending

E. Additional Information

Further information is available at my personal home page at http://aptafti.com