

# Ahmad P. Tafti, PhD

Assistant Professor, Division of Digital Health Sciences  
Mayo Clinic, Rochester, MN, USA

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## Research Interests

Artificial Intelligence, Machine Learning, Deep Learning Computer Vision, Health Informatics

## Education

2016–2017 Postdoctoral Fellow, Biomedical Informatics, Marshfield Clinic Research Institute, USA  
2013–2016 Ph.D., Computer Science, University of Wisconsin-Milwaukee, USA  
2008–2011 M.Sc., Computer Science, Azad University, UAE and Iran  
1993–1998 B.Sc., Computer Science, Azad University, Iran

## Appointments

2019–Present	Assistant Professor and Associate Consultant I, Division of Digital Health Sciences, Mayo Clinic
2018–2019	Research Associate, Division of Digital Health Sciences, Mayo Clinic
2017–2018	Associate Research Scientists, Biomedical Informatics Research Center, Marshfield Clinic Research Institute, USA
2016–2017	Postdoctoral Fellow, Marshfield Clinic Research Institute, USA
2013–2016	Teaching/Research Assistant, Computer Science Department, University of Wisconsin-Milwaukee, USA
1998–2012	Database Administrator, ASYCUDA Project, Iran

## Additional Education & Certificates

2016	Practical Machine Learning, Johns Hopkins University, Certificate (Coursera)
2016	Visiting Student, Center for Computational Visualization, University of Texas Austin, USA
2012	Summer School on Image Processing, Technical University of Vienna, Austria
2001	Enterprise Oracle DBA Part 1A: Architecture and Administration, Oracle Education Center, Malaysia
2001	Enterprise Oracle DBA Part 1B: Backup and Recovery, Oracle Education Center, Malaysia
2001	Enterprise Oracle DBA Part 2: Performance Tuning, Oracle Education Center, Malaysia

## Honors and Awards

2017	NVIDIA GPU Grant, NVIDIA
2016	Best Reviewer Award, The Society of Digital Information and Wireless Communications (SDIWC). URL: <a href="https://sdiwc.net/best-reviewer-award.php">https://sdiwc.net/best-reviewer-award.php</a>
2016	3rd Place with Dr. A. Baghaie, Larry Hause Student Poster Competition, IEEE
2015	GE Healthcare Honorable Mention Award, UWM Student Poster Competition, GE
2015	Travel Award, 11th International Symposium on Visual Computing (ISVC)
2014	Travel Award, 10th International Symposium on Visual Computing (ISVC)

## Educational Interests and Accomplishments

### Teaching Assistant

CS 595	Capstone Project	University of Wisconsin-Milwaukee
CS 557	Introduction to Database Systems	University of Wisconsin-Milwaukee
CS 361	Introduction to Software Engineering	University of Wisconsin-Milwaukee
CS 250	Introductory Computer Programming	University of Wisconsin-Milwaukee
CS 240	Introduction to Engineering Programming	University of Wisconsin-Milwaukee

### Mentorship

**Mentee:** Mojtaba Fathi (PhD Student) 2016-2018

**Current Position:** Postdoctoral Scholar, University of Wisconsin-Milwaukee, USA

**Publications:**

[1] Omrani E, Tafti AP, Fathi MF, Moghadam AD, Rohatgi P, D'Souza RM, Yu Z. Tribological study in microscale using 3D SEM surface reconstruction. *Tribology International*. 2016 Nov 1;103:309-15.

**\*Note:** I had the honor to serve in his PhD Committee.

**Mentee:** Ehsun Behravesht (Master Student) 2016-2017

**Current Position:** Senior Software Engineer at Atlassian, Australia

**Publications:**

[1] Assefi M, Behravesht E, Liu G, Tafti AP. Big data machine learning using apache spark MLlib. In 2017 IEEE International Conference on Big Data (Big Data) 2017 Dec 11 (pp. 3492-3498). IEEE.

[2] Tafti AP, Behravesht 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. In 2017 IEEE International Conference on Big Data (Big Data) 2017 Dec 11 (pp. 3888-3896). IEEE.

**Mentee:** Fereshteh S. Bashiri (PhD-Level Intern) 2017-2018

**Current Position:** Project Scientist I, Marshfield Clinic Research Institute, USA

**Publications:**

[1] Tafti AP, Bashiri FS, LaRose E, Peissig P. Diagnostic classification of lung CT images using deep 3D multi-scale convolutional neural network. In 2018 IEEE International Conference on Healthcare Informatics (ICHI) 2018 Jun 4 (pp. 412-414). IEEE.

[2] Bashiri FS, LaRose E, Peissig P, Tafti AP. MCIndoor20000: A fully-labeled image dataset to advance indoor objects detection. *Data in brief*. 2018 Apr 1;17:71-5.

**Mentee:** Shi Yan (PhD-Level Intern) 2019-2020

**Current Position:** Intern at Mayo Clinic and PhD Student at University at Buffalo (UB), USA

**Publications:**

[1] Tafti AP, Soundararajan K, Yan S, Sohn S, Liu H, Kremers WK, Lewallen D, Taunton M, Maradit Kremers H. Deep learning computational vision to autonomous localization of knee joint space in plain radiographs. *AMIA 2020 Informatics Summit*.

[2] Yan S, Tafti AP, Sagheb E, Fu S, Sohn S, Ngufo C, Chaudhary V, Liu H, Kremers WK, Lewallen D, Taunton M, Maradit Kremers H. With or without knee total knee arthroplasty? Deep learning-powered strategy to detect TKA in plain radiographs. *2020 9th Annual International Congress of Arthroplasty Registries*.

**Mentee:** Krishna B. Soundararajan (Master-Level Intern) 2019-2019

**Current Position:** Machine Learning Engineer at Bola AI, USA

**Publications:**

[1] Tafti AP, Soundararajan K, Yan S, Sohn S, Liu H, Kremers WK, Lewallen D, Taunton M, Maradit Kremers H. Deep learning computational vision to autonomous localization of knee joint space in plain radiographs. *AMIA 2020 Informatics Summit*.

## Publications

Google Scholar profile: <https://scholar.google.com/citations?user=NxeXUqwAAAAJ&hl=en>

## Selected Peer-Reviewed Journal and Conference Papers

- [1] **Tafti AP**, Soundararajan K, Yan S, Sohn S, Liu H, Kremers WK, Lewallen D, Taunton M, Maradit Kremers H. Deep learning computational vision to autonomous localization of knee joint space in plain radiographs. AMIA 2020 Informatics Summit.
- [2] Yan S, **Tafti AP**, Sagheb E, Fu S, Sohn S, Ngufor C, Chaudhary V, Liu H, Kremers WK, Lewallen D, Taunton M, Maradit Kremers H. With or without knee total knee arthroplasty? Deep learning-powered strategy to detect TKA in plain radiographs. 2020 9th Annual International Congress of Arthroplasty Registries.
- [3] Yan S, Sagheb E, Fu S, Sohn S, Kremers WK, Chaudhary V, Liu H, Lewallen D, Taunton M, Maradit Kremers H, **Tafti AP**. Give me a knee radiograph, I will tell you where the knee joint area is: a deep convolutional neural network adventure. MIDL 2020 (Under Review)
- [4] **Tafti AP**, Fu S, Khurana A, Mastorakos GM, Poole KG, Traub SJ, Yiannias JA, Liu H. Artificial intelligence to organize patient portal messages: a journey from an ensemble deep learning text classification to rule-based named entity recognition. In 2019 IEEE International Conference on Bioinformatics and Biomedicine (BIBM) 2019 Nov 18 (pp. 1380-1387). IEEE.
- [5] **Tafti AP**, Wang Y, Shen F, Sagheb E, Kingsbury P, Liu H. Integrating word embedding neural networks with PubMed abstracts to extract keyword proximity of chronic diseases. IEEE BHI 2019, 2019.
- [6] Wang Y, Zhao Y, Therneau TM, Atkinson EJ, **Tafti AP**, Zhang N, Amin S, Limper AH, Khosla S, Liu H. Unsupervised machine learning for the discovery of latent disease clusters and patient subgroups using electronic health records. Journal of Biomedical Informatics. 2020 Feb 1;102:103364.
- [7] **Tafti AP**, Crowson C, O'Neill K, Myasoedova E, Liu H, Sinicrope P, Davis J. Deep Learning Social Media Analysis Demonstrated Gender-Specific Disparity in Side Effects from Rheumatoid Medications. In Arthritis Rheumatology 2019 Oct 1 (Vol. 71). 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY.
- [8] **Tafti AP**, Yue D, Habermann E, Liu H, Herasevich V. Relationship between very cold outside weather and surgical outcome: Integrating shallow and deep artificial neural nets. MedInfo 2019, 2019.
- [9] **Tafti AP**, Bashiri F, LaRose E, Peissig P. Diagnostic Classification of Lung CT Images using Deep 3D Multi-Scale Convolutional Neural Network. Accepted at ICHI 2018, 2018.
- [10] **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.
- [11] Bashiri FS, LaRose E, Peissig P, **Tafti AP**. MCIndoor20000: a fully-labeled image dataset to advance indoor objects detection. Data in Brief. 2018 Jan 3.
- [12] 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. In Medical Imaging 2018: Image Perception, Observer Performance, and Technology Assessment 2018 Mar 7 (Vol. 10577, p. 105770J). International Society for Optics and Photonics.
- [13] **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.

- [14] **Tafti AP**, LaRose E, Badger JC, Kleiman R, Peissig P. Machine learning-as-a-service and its application to medical informatics. In *International Conference on Machine Learning and Data Mining in Pattern Recognition 2017* Jul 15 (pp. 206-219). Springer, Cham.
- [15] Baghaie A, **Tafti AP**, Owen HA, D'Souza RM, Yu Z. SD-SEM: sparse-dense correspondence for 3D reconstruction of microscopic samples. *Micron*. 2017 Jun 1;97:41-55.
- [16] Baghaie A, **Tafti AP**, Owen HA, D'Souza RM, Yu Z. Three-dimensional reconstruction of highly complex microscopic samples using scanning electron microscopy and optical flow estimation. *PloS one*. 2017 Apr 6;12(4):e0175078.
- [17] Mehdi Assefi, Ehsun Behraves, 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.
- [18] **Tafti AP**, Behraves 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.
- [19] Ye Z, **Tafti AP**, He KY, Wang K, He MM. Sparktext: Biomedical text mining on big data framework. *PloS one*. 2016 Sep 29;11(9):e0162721.
- [20] **Tafti AP**, Baghaie A, Assefi M, Arabnia HR, Yu Z, Peissig P. OCR as a Service: An Experimental Evaluation of Google Docs OCR, Tesseract, ABBYY FineReader, and Transym. In *International Symposium on Visual Computing 2016* Dec 12 (pp. 735-746). Springer, Cham.
- [21] Omrani E, **Tafti AP**, Fathi MF, Moghadam AD, Rohatgi P, D'Souza RM, Yu Z. Tribological study in microscale using 3D SEM surface reconstruction. *Tribology International*. 2016 Nov 1;103:309-15.
- [22] **Tafti AP**, Holz JD, Baghaie A, Owen HA, He MM, Yu Z. 3DSEM++: Adaptive and intelligent 3D SEM surface reconstruction. *Micron*. 2016 Aug 1;87:33-45.
- [23] **Tafti AP**, Kirkpatrick AB, Holz JD, Owen HA, Yu Z. 3DSEM: A 3D microscopy dataset. *Data in Brief*. 2016 Mar 1;6:112-6.
- [24] Zhao M, Luo H, **Tafti AP**, Lin Y, He G. A Hybrid Real-Time Visual Tracking Using Compressive RGB-D Features. In *International Symposium on Visual Computing 2015* Dec 14 (pp. 561-573). Springer, Cham.
- [25] **Tafti AP**, Hassannia H, Piziak D, Yu Z. Selibcv: a service library for computer vision researchers. In *International Symposium on Visual Computing 2015* Dec 14 (pp. 542-553). Springer, Cham.
- [26] **Tafti AP**, Kirkpatrick AB, Alavi Z, Owen HA, Yu Z. Recent advances in 3D SEM surface reconstruction. *Micron*. 2015 Nov 1;78:54-66.
- [27] **Tafti AP**, Hassannia H, Borji A, Yu Z. Computer Vision as a Service: Towards an Easy-To-Use Platform for Computer Vision Researchers. *CVPR Workshop*. 2015.
- [28] **Tafti AP**, Hassannia H, Yu Z. siftservice. com-Turning a Computer Vision algorithm into a World Wide Web Service. *arXiv preprint arXiv:1504.02840*. 2015 Apr 11.

- [29] Bardosi Z, Granata D, Lugos G, **Tafti AP**, Saxena S. Metacarpal Bones Localization in X-ray Imagery Using Particle Filter Segmentation. arXiv preprint arXiv:1412.8197. 2014 Dec 28.
- [30] **Tafti AP**, Kirkpatrick AB, Owen HA, Yu Z. 3D microscopy vision using multiple view geometry and differential evolutionary approaches. In International Symposium on Visual Computing 2014 Dec 8 (pp. 141-152). Springer, Cham.
- [31] **Tafti AP**, Maarefdoust R. Digital Images Encryption in Spatial Domain Based on Singular Value Decomposition and Cellular Automata. International Journal of Computer Science and Information Security. 2013 Apr 1;11(4):121.
- [32] Malakooti MV, **Tafti AP**, Naji HR. An efficient algorithm for human cell detection in electron microscope images based on cluster analysis and vector quantization techniques. In Digital Information and Communication Technology and its Applications (DICTAP), 2012 Second International Conference on 2012 May 16 (pp. 125-129). IEEE.
- [33] **Tafti AP**, Janosepah S. Digital images encryption in frequency domain based on DCT and one dimensional cellular automata. In International Conference on Informatics Engineering and Information Science 2011 Nov 14 (pp. 421-427). Springer, Berlin, Heidelberg.
- [34] **Tafti AP**, Malakooti MV, Ashourian M, Janosepah S. Digital image forgery detection through data embedding in spatial domain and cellular automata. In Digital Content, Multimedia Technology and its Applications (IDCTA), 2011 7th International Conference on 2011 Aug 16 (pp. 11-15). IEEE.

## Book Chapter

- [1] **Tafti AP**, Hassannia H. Active Image Forgery Detection Using Cellular Automata. In Cellular Automata in Image Processing and Geometry 2014 (pp. 127-145). Springer, Cham.

## Thesis

- [1] **Tafti AP**. 3D SEM surface reconstruction: An optimized, adaptive, and intelligent approach (Doctoral dissertation, The University of Wisconsin-Milwaukee). 2016

## Professional Activities and Services

### Keynote Speaker

- “Artificial Intelligence in Healthcare”. The 5th Day Research, Fundación Valle del Lili, Cali, Colombia, December 2019.  
URL: <https://github.com/aptafti/aptafti.github.io/blob/master/images/5thday.jpg>
- “Deep Learning Computational Vision to Advance Knee Total Joint Arthroplasty Research”. UWM Big Data Seminars, University of Wisconsin-Milwaukee, Milwaukee, October 2019.  
URL: <https://sites.uwm.edu/bigdata/seminars>
- “Health Data Analytics: a Deep Learning Adventure”. European Conference on Information System and Data Mining (CISDM 2019), Amsterdam, Netherlands, September 2019.

**URL:** <http://www.ecisdsm.org>

- “Artificial Intelligence and Deep Learning; What and Why?”. The Deep Learning Fundamentals and Applications in Medical Informatics Workshop. Milwaukee, USA. April 2019.

**URL:** <https://web.cvent.com/event/472ac73b-360b-4c5a-a45d-d14cc0249321/summary1>

- “CNN Architectures and their application in medical image analysis”. The Deep Learning Fundamentals and Applications in Medical Informatics Workshop. Milwaukee, USA. April 2019.

**URL:** <https://web.cvent.com/event/472ac73b-360b-4c5a-a45d-d14cc0249321/summary1>

- “Convolutional Neural Networks”. The Journey from Machine Learning to Deep Learning Workshop, Marquette University. Milwaukee, USA. April 2018.

**URL:** <https://github.com/aptafti/aptafti.github.io/blob/master/images/DL2018.jpg>

## **Selected Conferences & Workshops Responsibilities**

- 15th International Symposium on Visual Computing (ISVC 2020).

**URL:** <http://www.isvc.net>

**Role: Steering Committee**

- International Symposium on Mathematical and Computational Oncology (ISMCO 2019).

**URL:** <http://ismco.net>

**Role: Steering Committee**

- IEEE International Conference on Health Informatics (ICHI 2019).

**URL:** [http://www.ieee-ichi.org/2019/systems\\_pc.html](http://www.ieee-ichi.org/2019/systems_pc.html)

**Role: Program Committee**

- KDD Big data-as-a-Service: Algorithms, Architecture, and Applications in Healthcare Informatics. KDD 2017.

**URL:** <https://www.kdd.org/kdd2017/workshops>

**Role: Organizer**

- Computer Vision-as-a-Service Special Track. ISVC 2016.

**URL:** [http://www.isvc.net/wp-content/uploads/2018/04/16\\_ST4.pdf](http://www.isvc.net/wp-content/uploads/2018/04/16_ST4.pdf)

**Role: Organizer**

## Journals & Conferences Editorial Responsibilities

Frontiers in Artificial Intelligence <b>Role: Referee/Reviewer</b>	2019 - Present
Frontiers in Big Data <b>Role: Referee/Reviewer</b>	2019 - Present
Elsevier International Journal of Medical Informatics <b>Role: Referee/Reviewer</b>	2019 - Present
Elsevier Journal of Image and Vision Computing <b>Role: Referee/Reviewer</b>	2019 - Present
Elsevier Journal of Computer Vision and Image Understanding <b>Role: Referee/Reviewer</b>	2019 - Present
MedInfo (World Congress of Medical and Health Informatics) <b>Role: Referee/Reviewer</b>	2019 - Present
IEEE International Conference on Health Informatics (ICHI) <b>Role: PC Member/Reviewer</b>	2018 - Present
American Medical Informatics Association, AMIA Informatics Summit <b>Role: Referee/Reviewer</b>	2017 - Present
Elsevier Journal of Micron <b>Role: Referee/Reviewer</b>	2017 - Present
IEEE Journal of Biomedical and Health Informatics <b>Role: Referee/Reviewer</b>	2017 - Present
American Medical Informatics Association, AMIA Annual Symposium <b>Role: Referee/Reviewer</b>	2016 - Present
Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, Taylor & Francis <b>Role: Referee/Reviewer</b>	2016 - Present
International Symposium on Visual Computing (ISVC) <b>Role: Referee/Reviewer</b>	2016 - Present
International Journal of Computer Vision & Signal Processing <b>Role: Editorial Board Member</b>	2016 - Present
International Journal of Computer Vision and Image Processing, IGI-Global <b>Role: Referee/Reviewer</b>	2016 - Present



## Selected GitHub Contributions

- **bigNN**: an open-source big data toolkit focused on biomedical sentence classification.  
URL: <https://github.com/bircatmcri/bigNN>
- **MCIndoor20000**: a fully-labeled image dataset to advance indoor objects detection.  
URL: <https://github.com/bircatmcri/MCIndoor20000>

## Selected Software-as-a-Service (SaaS) Implementation

- **SeLibCV**: an easy-to-use and high available service library for computer vision researchers.  
URL: <http://selibcv.net>

## Selected Scientific Talks Available on YouTube

- “3D Surface Modeling of Microscopic Objects”. Marshfield Clinic. Marshfield, USA. 2017.  
URL: <https://www.youtube.com/watch?v=rCCVJ0slY8o>
- “Data Mining Biomedical Literature in the Cloud”. Marshfield Clinic. Marshfield, USA. 2015.  
URL: <https://www.youtube.com/watch?v=p1HTnhZfOM8&t=9s>

## Grant Reviewer

- UW Institute for Clinical and Translational Research.  
URL : <https://ictr.wisc.edu>
- Catalyst Grant Program at UWM Research Foundation.  
URL : <https://uwmrf.org>

## Professional Memberships and Societies

American Medical Informatics Association (AMIA) <b>Member</b>	2019 - Present
Society for Imaging Informatics in Medicine (SIIM) <b>Member</b>	2019 - Present
Association for Computer Linguistics (ACL) <b>Member</b>	2019 - Present
Institute of Electrical and Electronics Engineering (IEEE) <b>Member</b>	2016 - Present

## Computer Skills

**Programming:** Java, Python, SQL.

**Machine Learning libraries:** Weka, SciPy, Scikits.

**Deep Learning libraries:** TensorFlow, Keras.

**NLP libraries:** Stanford CoreNLP, NLTK.

**Computer Vision libraries:** OpenCV, BoofCV.

**Database:** Oracle, SQL Server, Elasticsearch.

**Big data solutions:** Apache Spark, Apache Spark MLlib.

## Research Interests and Accomplishments

I am an Assistant Professor of Biomedical informatics and Associate Consultant I (AC I), working in the Division of Digital Health Sciences and Kern Center for the Science of Health Care Delivery at Mayo Clinic, with deep passion for improving health informatics with better patient diagnosis, prognosis, and treatment using artificial intelligence (AI) and machine learning (ML) algorithms combined with multiple clinical data (e.g., medical images, clinical notes, radiology reports, and EHRs). My research interests broadly lie in AI, Data Science, and Deep Learning Computational Vision and their application in Health Informatics. I earned my BSc, MSc, and PhD all in Computer Science, and since then, I have been on a quest to explore and solve problems that are “worth it” and have the most positive impact on people’s lives. I have solid background in computer science, with an extensive research experience in AI-powered descriptive and predictive modeling, image and text analytics, and big data processing to find solutions to a diverse set of problems in healthcare, ranging from 3D-2D medical image analysis to autonomous object localization, segmentation, and clinical prediction, as it has been already illustrated by my publication records. I have been actively collaborating with multidisciplinary team of investigators to build AI-enabled models in different clinical settings, such as Orthopedics, Gastrointestinal diseases, Chronic pain treatment and management, and Cardiovascular diseases.