Wei-Hung **Weng**

Biomedical Informatician · Computer Science Researcher · Pathologist

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Education

Massachusetts Institute of Technology (MIT) — *Cambridge, MA, USA*

Ph.D. in Computer Science and Artificial Intelligence — *Sep. 2017 -*

- Received Graduate Fellowship

Harvard Medical School (HMS) — *Boston, MA, USA*

Master of Medical Science (MMSc) in Biomedical Informatics — *Sep. 2015 - May 2017*

- Received Graduate Fellowships

Chang Gung University — *Taoyuan, Taiwan*

Doctor of Medicine (M.D.) — *Sep. 2004 - Jun. 2011*

- Harvard Medical School, Exchange Student (Massachusetts Eye and Ear Infirmary) (Jun 2011)

Skills

Domain	Machine learning, Deep learning, Probabilistic programming, Natural language processing, Data mining, Statistics, Medical database, Bioinformatics
Programming	Python, R, Matlab, Linux, LaTeX, HTML5, Git, Tensorflow, PyTorch, Keras, Scikit-learn, Stan, Bioconductor, cTAKES, MetaMap, CLAMP, UMLS, MIMIC, Tableau, ImageJ, Photoshop, InDesign
Languages	English, Chinese, Japanese
Medicine	Board Certificate of Medical Doctor, Advanced Cardiovascular Life Support, Certificate of Clinical Trial

Research Experience

Computer Science and Artificial Intelligence Laboratory (CSAIL), MIT — *Cambridge, MA*

Graduate Researach Assistant in Clinical Decision Making Group (Prof. Peter Szolovits) — *Sep. 2017 -*

- Learning representation of multi-modal data
- Reinforcement learning for sequential clinical decision making

MIT Critical Data — *Cambridge, MA*

Instructor, Mentor — *Jul. 2017 -*

- Gave two lectures in the course, mentored projects of ICU data mining and analysis, conducted six datathon and workshop events for collaborative data science in medicine

Laboratory of Computer Science, Massachusetts General Hospital — *Boston, MA*

Postdoctoral Research Fellow in Laboratory of Computer Science and Department of Neurology (Drs. Henry Chueh, Brandon Westover) — *Sep. 2015 - May 2017*

- Building generalized clinical document classification system using NLP, ontology and deep learning
- Identifying medical concepts in the unstructured data automatically for undiagnosed disease patients
- Predicting potential refractory epilepsy using clinical notes by deep neural network
- Analyzing cost-effectiveness decision of using continuous EEG on post resuscitation patients
- Improving the outcome of kidney transplantation patients by data-driven mobile educational modules

Division of Clinical Informatics Solutions and Services, Philips Research North America — *Cambridge, MA*

Research Internship (Dr. Sandeep Dalal) — *Jun. 2016 - Aug. 2016*

- Initiated the anatomy extraction project for radiology reports using ontology and neural word embedding

Molecular Imaging Center, National Taiwan University — *Taipei, Taiwan*

Research Associate (Prof. Chi-Kuang Sun) — *May 2014 - Apr. 2015*

- Developed the qualitative and deep learning methods to identify skin melanocytes in microscopic imaging
- Proposed a go-to market strategy of virtual biopsy microscopy for skin cancer detection

Kidney Research Center / Cancer Molecular Diagnostics Lab / Department of Psychology, Chang Gung Memorial Hospital — *Taoyuan, Taiwan*

Undergraduate Research Assistant (Profs. Lee-Yung Shih, Ya-Chung Tian, Chin-Yen Chen) — *Jun. 2008 - May 2011*

- Investigated cytokines effects on polyomavirus BK infection
- Clinical data analysis of concomitance of essential thrombocythemia and chronic myeloid leukemia
- Investigated the relationship between sleepiness scale and heart rate variability in medical students

Cancer Immunology and Gene Therapy Lab, Johns Hopkins Medical Institute — *Baltimore, MD*

Summer Research Assistant (Prof. Tzyy-Choou Wu) — *Jul. 2009 - Aug. 2009*

- Immunology/molecular cell biology techniques training and review writing

Clinical Experience

Chang Gung Memorial Hospital — *Taoyuan, Taiwan*

Resident Physician in Pathology and General Medicine — *Aug. 2012 - Apr. 2014*

- Supervised more than 10 medical clerks, interns and residents
- Selected as visiting scholar to Department of Pathology, University of Tokyo Hospital, Tokyo, Japan

Republic of China Army — *Taoyuan, Taiwan*

Medical Officer of Health, Secondary Lieutenant — *Aug. 2011 - Jul. 2012*

- Managed a medical clinic, and a shelter for soldiers with psychiatric diseases
- Volunteered in Mbanane Government Hospital in Swaziland, for critical ward care and rural outreaches

Honors & Awards

Scholarship

2017	**Rolf G. Locher Graduate Fellowship**, MIT	*Cambridge, MA*
2015	**Scholarship of Harvard University Alumni Association (HAA) in Taiwan**, HAA in Taiwan	*Taipei, Taiwan*
2015	**Wang Yuan-Chun Memorial Medical Contribution Scholarship**, HAA in Taiwan	*Taipei, Taiwan*

Academic

2006-08	**Presidential Award**, CGU Medicine (top 5% students)	*Taoyuan, Taiwan*

Award

2017	**Travel Award**, NIPS Machine Learning for Health 2017	*Boston, MA*
2015	**Semifinalist (TxNet - Education app for kidney transplant patients)**, BWH Startup Program	*Boston, MA*
2015	**First Prize Award (Fetal heart beat detector)**, HIT Biomedical Innovation Hackathon	*Taipei, Taiwan*
2011	**Objective Structured Clinical Examination (OSCE) Award**, Taiwan Association of Medical Education	*Kaohsiung, Taiwan*
2011	**Second Prize**, Medical Record Writing Competition	*Kaohsiung, Taiwan*
2011	**Great Honor**, Taiwan Medical Development Awards for Outstanding Writings	*Taipei, Taiwan*
2009	**Research Funding**, Medical Foundation in Memory of Dr. Deh-Ling Cheng	*Kaohsiung, Taiwan*

Publications

Conferences

1. **Weng WH**, Szolovits P. Mapping Unparalleled Clinical Professional and Consumer Languages with Embedding Alignment. 2018 KDD Workshop on Machine Learning for Medicine and Healthcare, and KDD 2018 Health Day.
2. Chung YA, **Weng WH**, Tong S, Glass J. Unsupervised Cross-Modal Alignment of Speech and Text Embedding Spaces. NIPS 2018.
3. McDermott M, Vide S, Alenyà M, Tróconiz IF, Valencia JF, Borrat X, **Weng WH**, Szolovits P, Gambús PL. Continuous Prediction of Sedation Levels Based on Signal Inputs: Evaluation of Different Modeling Approaches Including Machine Learning. ISAP 2018.
4. **Weng WH**, Gao M, He Z, Yan S, Szolovits P. Representation and Reinforcement Learning for Personalized Glycemic Control in Septic Patients. NIPS Machine Learning for Health 2017.
5. **Weng WH**, Chung YA. Learning Image Representations using Deep Siamese CNNs for Content-Based Medical Image Retrieval. Medical Imaging meets NIPS 2017 / NIPS Machine Learning for Health 2017.
6. **Weng WH**, Wagholikar KB, Chueh HC. Computing Performance Analysis on Clinical Document-level Classification. AMIA 2017.
7. **Weng WH**, Wagholikar KB, Chueh HC. Classifiers for Identifying the Medical Specialty of Clinical Documents. 2017 AMIA Joint Summits on Translational Science.

8. Sun CK, Wei ML, Su YH, **Weng WH**, Liao YH. Molecular imaging of melanin distribution in vivo and quantitative differential diagnosis of human pigmented lesions using label-free harmonic generation biopsy. SPIE Photonics West 2017.
9. **Weng WH**. Predictive Analytics Pipeline for Clinical Narrative Document Classification. Artificial Intelligence in Medicine 2016.
10. **Weng WH**. Medical Domain Classification with Sequential Label-Embedded Neural Concept Embedding Model. Artificial Intelligence in Medicine 2016.
11. **Weng WH**, Khatri A, Wagholikar KB, Cohen AB, Chueh HC. Improving the Workflow of Curbside Consultation by Using Unstructured Clinical Notes - a Natural Language and Machine Learning-based Approach. AMIA 2016.
12. **Weng WH**, Wagholikar KB. Supervised Clinical Document Classification Pipeline. AMIA 2016 NLP WG Pre-Symposium.
13. **Weng WH**, Wagholikar KB. Classifying Clinical Documents into Medical Domains. AMIA 2016 NLP WG Pre-Symposium.
14. **Weng WH**, Liao YH, Tsai MR, Huang HY, Sun CK. Differentiating intratumoral melanocytes from Langerhans cells in non-melanocytic pigmented skin tumors in vivo by using third harmonic generation microscopy. Focus on Microscopy Conference 2016.
15. Huang HF, **Weng WH**, Hsu WH, Sun CK. Automated Detection of Noninvasive Imaging of Basal Cell Carcinoma by Convolutional Neural Network. NIPS 2015 Workshop on Machine Learning in Healthcare.
16. **Weng WH**, Tsai MR, Liao YH, Sun CK. Differentiating pigmented skin tumors by the tumor-associated melanocytes based on in vivo third harmonic generation microscopy. SPIE Photonics West 2015.
17. Lee SY, **Weng WH**, Sun CK. Super resolution brain imaging by using a two-photon fluorescence microscopy with harmonic modulation. SPIE Photonics West 2015.
18. Chou YH, Hung SY, Lee GG, **Weng WH**, Liao YH, et al. Nuclei location enhancement based on improved efficient ellipse hough transform for third harmonic generation microscopy imaging. IEEE ChinaSIP 2015.
19. Liao YH, **Weng WH**, Sun CK. Characterization of dendritic cells in pigmented skin tumors by harmonic generation microscopy. 23rd World Congress of Dermatology 2015.
20. Lee GG, Cai CS, Liao YH, **Weng WH**, Sun CK, et al. Quantitative Gabor feature analysis of collagen fibers in harmonically generated microscopy (HGM) imaging. OMICS International Global Summit and Expo on Multimedia and Applications ETMN Pre-conference Workshop 2015.
21. **Weng WH**, Tsai MR, Liao YH, Sun CK. Identifying melanocyte in pigmented skin lesions based on in vivo third harmonic generation microscopy. Biomedical Molecular Imaging 2014.
22. **Weng WH**, Liu WM, Tsai MR, Liao YH, Sun CK. In vivo quantification of melanin mass density in human by using third harmonic generation microscopy. Biomedical Molecular Imaging 2014.
23. **Weng WH**, Tian YC. Interleukin-1 beta Inhibits BK virus gene expression and replication in human renal proximal tubular epithelial cells. Taiwan Medical Development Awards for Outstanding Writings 2010.
24. **Weng WH**, Tian YC. IL-1 has suppressive effect on BKV replication. Summer Student Study for Infectious Disease 2009.

Journals

1. **Weng WH**, Wagholikar KB, McCray AT, Szolovits P, Chueh HC. Medical subdomain classification of clinical notes using machine learning-based natural language processing approach. BMC Medical Informatics and Decision Making. 17(1):155.
2. **Weng WH**, Liao YH, Tsai MR, Wei ML, Huang HY, Sun CK. Differentiating intratumoral melanocytes from Langerhans cells in nonmelanocytic pigmented skin tumors in vivo by label-free third-harmonic generation microscopy. Journal of biomedical optics. 2016 Jul;21(7):076009.
3. Liu CH, Tang WR, **Weng WH**, Lin YH, Chen CY. The process of coping with stress by Taiwanese medical interns: a qualitative study. BMC medical education. 2016 Dec;16(1):10.
4. Lin YH, Chen CY, Lin SH, Liu CH, **Weng WH**, Kuo TB, Yang CC. Gender differences in cardiac autonomic modulation during medical internship. Psychophysiology. 2013 Jun;50(6):521-7.
5. **Weng, WH**, Shih LY. Occurrence of BCR-ABL1-positive chronic myeloid leukemia following essential thrombocythemia. Acta haematologica. 2011;126(4):220-3.
6. Hung CF, Monie A, Weng WH, Wu TC. DNA vaccines for cervical cancer. American journal of translational research. 2010;2(1):75.

Scholarly Addresses

2018/07	**Conference Tutorial: Machine Learning for Clinical Predictive Analytics**, in Big Data for Health workshops and conference	*Manila, Philippines*
2018/07	**Conference Tutorial: Secondary Usage of Critical Care EMR Data for Care Improvement - Deep Learning for Clinical Predictive Analytics**, in Healthcare AI Datathon - Technical Workshop	*Singapore, Singapore*
2018/07	**Invited clinical and data science mentor**, in Healthcare AI Datathon	*Singapore, Singapore*
2017/11	**Invited clinical and data science mentor**, Chinese PLA General Hospital-MIT Health Data Conference and Workshop	*Beijing, China PRC*
2017/07	**Conference Tutorial: Biomedical Text Mining and Natural Language Processing Workshop**, in UP-MIT-Stanford-AeHIN Big Data for Health Conference and Workshops for Asia-Pacific	*Cebu, Philippines*
2017/07	**Invited talk: Artificial Intelligence in Medicine**, in UP-MIT-Stanford-AeHIN Big Data for Health Conference and Workshops for Asia-Pacific	*Cebu, Philippines*
2017/06	**Invited talk: Artificial Intelligence in Healthcare Analytics**, in NUS-MIT Healthcare Analytics Datathon	*Singapore, Singapore*
2016/10	**Invited panelist**, Deconstructing the Hype around Big Data and Precision Medicine	*Taipei, Taiwan*
2016/09	**Invited panelist, mentor and judge**, MIT-TMU Internet of Things Hackathon	*Taipei, Taiwan*

Professional Activities

2018	**Organizing Committee and Moderator**, Boston Taiwanese Biotechnology Symposium 2018	*Cambridge, MA*
2018	**TBI Year-in-Review Workgroup Member**, AMIA 2018 Joint Summits on Translational Science	*San Francisco, CA*
2017	**Scientific Program Committee**, AMIA 2017 Annual Symposium	*Washington, DC*
2017	**TBI Year-in-Review Workgroup Member**, AMIA 2017 Joint Summits on Translational Science	*San Francisco, CA*
2019	**Reviewer**, AMIA 2019 Informatics Summits	*San Francisco, CA*
2018	**Reviewer**, IEEE Transactions on Industrial Informatics	
2018	**Reviewer**, AMIA 2018 Annual Symposium	*San Francisco, CA*
2018	**Reviewer**, AMIA 2018 Joint Summits on Translational Science	*San Francisco, CA*
2017	**Reviewer**, International Journal of Medical Informatics	
2017	**Reviewer**, NIPS 2017 Machine Learning for Health Workshop	*Long Beach, CA*

Academic Lectures

Fall, 2018	**Collaborative Data Science in Medicine**, HST.953, MIT	*Cambridge, MA*
Fall, 2016	**Lab of Introduction of Biomedical Informatics**, BMI701, Harvard Medical School	*Boston, MA*