

# Yu-Chia Chen

PH.D. STUDENT AT THE UNIVERSITY OF WASHINGTON

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## Summary

- Research** Manifold learning, Geometric data analysis, Dynamic networks, Embedding.
- Publications** First author of 2 top-tier Machine Learning conference (NeurIPS, KDD) papers and 1 NeurIPS workshop poster.
- Affiliations** Institute for Pure and Applied Mathematics, Microsoft Corporation, University of Washington, National Taiwan University.
- Programming Languages** Python (Advanced), MATLAB (Advanced), JavaScript (Intermediate), C++ (Intermediate).  
English (Professional), Mandarin (Native), Taiwanese (Native).

## Education

### University of Washington

PH.D. IN ELECTRICAL ENGINEERING

- Advisor: Marina Meilă

Seattle, WA

Sep. 2016 - PRESENT

### National Taiwan University

B.S. IN PHYSICS

Taipei, Taiwan

Sep. 2011 - Jun. 2015

## Publications

### REFERRED PUBLICATIONS

- [1] **YU-CHIA CHEN** and Marina Meilă. Selecting the independent coordinates of manifolds with large aspect ratios. In *Advances in Neural Information Processing Systems* 32, pages 1086–1095, 2019
- [2] Samson J. Koelle, Hanyu Zhang, Marina Meilă and **YU-CHIA CHEN**. Manifold Coordinates with Physical Meaning. *Second Workshop on Machine Learning and the Physical Sciences (NeurIPS 2019)*, Vancouver, Canada, December, 2019
- [3] **YU-CHIA CHEN**, Avleen S. Bijral, and Juan Lavista Ferres. On Dynamic Network Models and Application to Causal Impact. In *Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*, KDD '19, pages 1194–1204, Anchorage, AK, USA, 2019. ACM
- [4] **YU-CHIA CHEN**, Dominique Perrault-Joncas, Marina Meilă, and James McQueen. Improved Graph Laplacian via Geometric Self-Consistency. *NIPS Workshop on NIPS Highlights (MLTrain)*, *Learn How to code a paper with state of the art frameworks*, Long Beach, CA, December 2017
- [5] Peifeng Jing, Kosuke Winston, **YU-CHIA CHEN**, Benjamin S. Freedman, and Lih Y. Lin. Patterning and Colonizing Stem Cells with Optical Trapping. In *Optics in the Life Sciences Congress (2017)*, *Paper OtM4E.2*, page OtM4E.2. Optical Society of America, April 2017
- [6] **YU-CHIA CHEN**, Cih-Su Wang, Tsung-Yuan Chang, Tai-Yuan Lin, Hsiu-Mei Lin, and Yang-Fang Chen. Ultraviolet and visible random lasers assisted by diatom frustules. *Optics Express*, 23(12):16224–16231, June 2015
- [7] Cih-Su Wang, Chi-Shung Liao, Tzu-Ming Sun, **YU-CHIA CHEN**, Tai-Yuan Lin, and Yang-Fang Chen. Biologically inspired band-edge laser action from semiconductor with dipole-forbidden band-gap transition. *Scientific Reports*, 5:8965, March 2015

### PREPRINTS/UNDER REVIEW/TECHNICAL REPORTS

- [8] **YU-CHIA CHEN**, James McQueen, Samson J. Koelle, Marina Meilă, Stefan Chmiela and Alexandre Tkatchenko. Modern Manifold Learning Methods for MD data – a step by step procedural overview. <http://students.washington.edu/yuchaz/files/2020-md-manifold.pdf>
- [9] Samson J. Koelle, Hanyu Zhang, Marina Meilă and **YU-CHIA CHEN**. Manifold Coordinates with Physical Meaning. (Under review at JMLR)

## Experience

### Geometric Data Analysis Group (prof. Marina Meilă), University of Washington

PH.D. STUDENT RESEARCHER

Seattle, WA

Apr. 2017 - PRESENT

- Selecting the independent coordinates of manifolds with large aspect ratios.
  - Efficient criterion based subset selection algorithm for finding independent coordinates that produce smooth embedding.
  - Paper [1] accepted to NeurIPS 2019 (acceptance rate 21.2%).
- Fast random projection based graph Laplacian construction algorithm for large scale manifold learning.
- Manifold learning for molecular dynamics (MD) simulation data [8].

## Microsoft Research

RESEARCH INTERN

Redmond, WA

Jun. 2018 - Sep. 2018

- Studied large scale dynamic network model based on stochastic block model (SBM) and the extension to causal impact on temporal graphs.
- Paper [3] accepted to KDD 2019 research track (acceptance rate 14.2%).

## Psychological Warfare Group, Ministry of National Defense

FRONT-END SOFTWARE ENGINEER (COMPULSORY MILITARY SERVICE)

Taipei, Taiwan

Aug. 2015 - Jul. 2016

- Lead engineer on cloud-based file exchanging platform, which enabled user to search, view and share streaming media.
- Technology used: JavaScript (*react.js*), HTML/CSS.

## Semiconductor Laboratory (prof. Yang-Fang Chen), National Taiwan University

UNDERGRADUATE RESEARCHER

Taipei, Taiwan

Feb. 2014 - Jun. 2015

- Investigated bio-photonics devices with wide spectrum range [6].
- Studied Perovskite and CdTe core shell quantum dots assisted random laser in bio-inspired materials [7].

## Other Experience & Course Projects

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### Institute for Pure & Applied Mathematics (IPAM), UCLA

VISITING RESEARCHER

Los Angeles, CA

Sep. 2019 - Dec. 2019

- Participant of the *Machine Learning for Physics and the Physics of Learning* long program.
- White paper: <https://www.ipam.ucla.edu/news/white-paper-machine-learning-for-physics-and-the-physics-of-learning/>

### Department of Electrical & Computer Engineering, University of Washington

TEACHING ASSISTANT

Seattle, WA

Jan. 2017 - Dec. 2017

- Courses: Digital Signal Processing (graduate level), Devices And Circuits, Discrete Time Linear Systems, Fundamentals of Electrical Engineering.

### Selfie Sensei: Convolutional Neural Network based selfie instructor

COURSE PROJECT

Seattle, WA

Apr. 2017 - Jun 2017

- Built and trained the Google Inception-v3 model on 40 thousand selfies collected from twitter with hashtag *#selfie*.

### Large scale medical subject heading (MeSH) term indexing

COURSE PROJECT

Seattle, WA

Jan. 2017 - Mar. 2017

- Built a CNN trained with *skipgram* word2vec embedding to annotate 27k MeSH terms on 12M academic articles.

### Photonics Lab, University of Washington

GRADUATE RESEARCH ASSISTANT

Seattle, WA

Sep. 2016 - Dec. 2016

- Investigated high accuracy mass sensing using Nanostructure-enhanced laser tweezers and its application to stem cell patterning [5].

### ScoreMaster Team

CO-FOUNDER

Taipei, Taiwan

Dec. 2013 - Aug. 2014

- Developed online tutoring platform that matched high school students and undergraduate tutors.

## Honors & Awards

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2019 **Student Travel Award**, NeurIPS 2019

Vancouver, Canada

2019 **Student Travel Award**, KDD 2019

Anchorage, AK

2019 **Travel Grant**, UW Department of Electrical & Computer Engineering

Seattle, WA

2013 **Scholarship**, Taipower Academic Scholarship

Taipei, Taiwan

2012 **Scholarship**, Taipower Academic Scholarship

Taipei, Taiwan

2010 **Second prizes**, Physics Scholastic Ability Contest

Kaohsiung, Taiwan

## Selected Talks

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Dec. 2019 **Poster Presentation**, NeurIPS'19, *Selecting the Independent Coordinates of Manifolds with Large Aspect Ratios*.

Vancouver, Canada

Oct. 2019 **Seminar Talk**, IPAM, *Selecting the Independent Coordinates of Manifolds with Large Aspect Ratios*.

Los Angeles, CA

Aug. 2019 **Poster Presentation**, KDD'19, *On Dynamic Network Models and Application to Causal Impact*.

Anchorage, AK

Sep. 2018 **Seminar Talk**, Microsoft, *On Dynamic Network Models and Application to Causal Impact*.

Redmond, WA

Jan. 2018 **Seminar Talk**, UW Geometric Data Analysis Group, *Improved Graph Laplacian via geometric self-consistency*.

Seattle, WA

## Coursework

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### UNIVERSITY OF WASHINGTON

**CSE 525** Randomized Algorithm; **EE 546** Learning and Game Theory; **STAT 512** Statistical Inference; **STAT 548** Machine Learning for Big Data; **STAT 538** Statistical Learning; **CSE 599** Interplay between Convex Optimization and Geometry; **MATH 515** Fundamental of Optimization; **EE 576** Computer Vision; **EE 595** Data Science for Sequencing; **CSE 517** Natural Language Processing; **EE 518** Digital Signal Processing.

### NATIONAL TAIWAN UNIVERSITY (SELECTED)

**PHYS 8049** Introduction to Quantum Computation & Information; **PHYS 4001** Optics; **PHYS 3002** Group Theory; **PHYS 3001** Complex Analysis.

## References

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### Marina Meilă

DEPARTMENT OF STATISTICS, UNIVERSITY OF WASHINGTON

*mmp@stat.washington.edu*

### Avleen S. Bijral

MICROSOFT CORPORATION

*avbijral@microsoft.com*

### Les Atlas

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING, UNIVERSITY OF WASHINGTON

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### Yang-Fang Chen

DEPARTMENT OF PHYSICS, NATIONAL TAIWAN UNIVERSITY

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