

KWAN HO RYAN CHAN

ryanckh@seas.upenn.edu ◊ (626) 400-3159 ◊ ryanchankh.github.io ◊ Philadelphia, PA

EDUCATION

Doctor of Philosophy in Electrical and Systems Engineering, Expected: '26

University of Pennsylvania

- Awards: National Science Foundation Graduate Research Fellow (NSF GRFP), UPenn Dean's Fellowship
- Advisors: Professor René Vidal, Professor Donald Geman
- Interests: Building theory and applications of trustworthy algorithms for vision-language and biomedical domains
- Practicums: TA for ESE6800-Deep Generative Models; Undergrad Mentor for Graduate Student Mentoring Initiative

Bachelor of Arts in Applied Mathematics, Class of '19

with concentration in Electrical Engineering and Computer Sciences

University of California, Berkeley

- Advisor: Professor Yi Ma
- Interests: Learning representations with sparse and low-rank structures from high-dimensional data
- Practicum: TA for CS294-Geometry and Learning for 3D Vision

INDUSTRY AND RESEARCH EXPERIENCE

Machine Learning Researcher

Lawrence Livermore National Laboratory

May '20 - July '21

Livermore, CA

- Published three medical journals and one workshop paper related to COVID-19 patient risk stratification and failure-state classification of energy power transformers
- Collaborated with experts from four different domains including medical doctors from UCSF and UToledo, energy researchers from US Department of Energy

Deep Learning Research Intern

AI Application Research Center, Huawei Technologies

Jun '19 - Aug '19

Shenzhen, China

- Deployed an end-to-end facial recognition pipeline for in-house security that served over 50,000 employees
- Led an AI project on adversarial attacks and implemented scalable methods for stronger defenses

Software Development Engineering Intern

51JOB

Jun '18 - Aug '18

Shanghai, China

- Implemented natural language parsers for a high-speed resume-to-job recommendation system with over 70M users
- Developed comprehensive server-pressure tests for scaling-up product's runtime and memory performance analysis

SKILLS

Programming Languages: Python, Java, Matlab

ML/AI Frameworks: OpenAI API, PyTorch, Tensorflow, Keras, MXNet, Sklearn

Data Analysis: Jupyter Notebooks, NumPy, SciPy, Pandas, Matplotlib, OpenCV

Development Tools: Git, AWS, GCP, Weight & Biases, Microsoft Office

Fluent Languages: English, Chinese (Mandarin and Cantonese)

PUBLICATION HIGHLIGHTS

- Aditya Chattopadhyay*, Kwan Ho Ryan Chan*, René Vidal. **Bootstrapping Variational Information Pursuit with Foundation Models for Interpretable Image Classification.** *ICLR*, '24. ([paper](#))
- Jinqi Luo, Kwan Ho Ryan Chan, Dimitris Dimos, René Vidal. **Knowledge Pursuit Prompting for Zero-Shot Multimodal Synthesis.** *preprint*, '24. ([paper](#))
- Aditya Chattopadhyay, Kwan Ho Ryan Chan, Benjamin D. Haeffele, Donald Geman, René Vidal. **Variational Information Pursuit for Interpretable Predictions.** *ICLR*, '23. ([paper](#), [code](#))
- Kwan Ho Ryan Chan*, Yaodong Yu*, Chong You*, Haozhi Qi, John Wright, Yi Ma. **ReduNet: A White-box Deep Network from the Principle of Maximizing Rate Reduction.** *JMLR*, '22. ([paper](#))([code](#))
- Yaodong Yu*, Kwan Ho Ryan Chan*, Chong You, Chaobing Song, and Yi Ma. **Learning Diverse and Discriminative Representations via the Principle of Maximal Coding Rate Reduction.** *NeurIPS*, '20. ([paper](#), [code](#))

KWAN HO RYAN CHAN

PROJECT HIGHLIGHTS

Leveraging Foundational Models for Interpretability in Large-scale Tasks

Feb '22 - Jan '23

IDEAS, University of Pennsylvania

Philadelphia, PA

- A scalable method of forming interpretable verbal annotations about visual data and harnessing large vision-language models to find interpretable concepts for downstream tasks using Information Pursuit
- Engineered prompts as inputs to foundational models such as GPT-3 for downstream image classification tasks
- Achieved state-of-the-art test performance on large-scale classification tasks such as ImageNet and Places365

Interpretable Predictions and Discoveries for Prostate Gene Expression Profiles

Nov '22 - Current

Johns Hopkins University

Baltimore, MD

- An application of Information Pursuit to multi-modal cancer including mRNA gene expressions and methylation data
- Partnered with Weill Cornell Medical College doctors to validate biological interpretations of generated explanations
- Predicted patients' probability of relapse and metastasis with per-sample ranking of available features by importance
- Generated distributional explanations that relate and align with existing genetic pathways from online databases

Information Pursuit for Interpretable Machine Learning

Aug '21 - Nov '22

Vision Lab, Johns Hopkins University

Baltimore, MD

- A interpretable-by-design machine learning framework to learn tasks with user-defined queries for explainable predictions
- Developed a variational approach that achieves 100x computational speed improvement versus generative approaches
- Achieved state-of-the-art results against reinforcement-learning methods on image classification and disease prediction

Learning Low-dimensional Structures from High-dimensional Data

Jan '19 - Oct '22

Department of Electrical Engineer & Computer Sciences, UC Berkeley

Berkeley, CA

- A novel unifying framework known as Maximal Coding Rate Reduction that provides theoretical and empirical guarantees to learn low-rank representations with sparse and low-rank geometric properties
- Published two journals, two conference and two workshop papers including generative approach for image generation, variational forms for computational speed improvements and clustering methods for unsupervised settings
- Presented the framework at workshops and seminars invited by academic institutions and machine learning groups

COVID-19 Patient Risk Stratification under Cost Constraints

May '20 - Jun '21

Lawrence Livermore National Laboratory

Livermore, CA

- A fast, accessible, and explainable risk score model that predicted COVID-19 patients' need for hospitalization, ventilation, or death based on their Electronic Health Records and costs of related lab tests
- Collaborated with doctors from UCSF and published three medical journal papers on different modeling approaches
- Implemented data imputation, feature engineering and classification methods on incomplete and imbalanced data

Localized Adversarial Attack on Semantic Features in ArcFace

Jun '19 - Dec '19

AI Application Research Center, Huawei Technologies

Shenzhen, China

- A robustness and vulnerability analysis of company's facial recognition security system to adversarial attacks on face images based on identifiable semantic and localized facial features
- Deployed pipelines to evaluate robustness and test adversarial attacks and defenses for future developed models
- Presented an exit talk with survey of related works and future directions to a group of 30 research scientists at AARC

Model Optimization through Neural Network Pruning

Jun '19 - Jul '19

AI Application Research Center, Huawei Technologies

Shenzhen, China

- An empirical and theoretical analysis of recent deep network pruning methods that aimed to optimize prediction performance and computational efficiency
- Compiled a survey of network pruning literature and results from simple synthetic experiments for a weekly seminar with 100+ attendees of researchers

Resume Recommendation System using Neural Network Parser

Jun '18 - Aug '18

51JOB

Shanghai, China

- A user-focused recommendataion system that employed natural language parsers to extract keywords and topics from resumes and recommend suitable job descriptions for job-seekers
- Implemented a scalabe algorithm that process 100k+ Chinese sentences to speed up data processing by 100-150%
- Performed hyperparameter tuning that improved product's recommendation accuracy by 1-2%