RAN LIU

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EDUCATION

Georgia Institute of Technology, Atlanta, GA — Aug 2019 - Present
Ph.D. student in Electrical and Computer Engineering — GPA: 4.0/4.0
Fudan University, Shanghai, China — Sep 2015 - Jun 2019
Bachelor of Science in Physics — GPA: 3.6/4.0
University of California, Berkeley, Berkeley, CA — Jan 2017 - May 2017
Exchange Student in Physics — GPA: 3.9/4.0

RESEARCH EXPERIENCES (SELECTED)

Generative modeling and interpretability of brain structures — Jan 2020 - Present
Advisor: Prof. Eva Dyer, Georgia Institute of Technology

- Applied variational autoencoder (VAE) to perform generative modeling of brain imagery and fine-tuned the intensity of regularizer to improve the denoising and inpainting ability.
- Developed a bidirectional approach to interpret low-dimensional latent representation of deep generative models from both the receptive field and the projective field of a neural net.
- Submitted a paper to MICCAI (see publication).

Temporal modeling and prediction of controversial posts — Aug 2019 - Dec 2019
Advisor: Prof. Diyi Yang, Georgia Institute of Technology

- Developed and applied state-of-the-art machine learning models (including BERT, BiLSTM, CRF, etc.) on a classification task of discourse acts and achieved record-high F1 score.
- Designed and extracted domain knowledge features about controversy-causing posts and employed those features on an early prediction task.
- Conducted temporal modeling of controversial posts' discussion structures with linguistic analysis of discourse acts and feature engineering results.
- Currently advising graduate student on the further development of this project.

Link recommendation based on hierarchical graph analysis — Jan 2019 - Jun 2019
Advisor: Prof. Deqing Yang, Fudan University

- Constructed hierarchical information graph based on user connection and geo-location from a self-crawled Twitter dataset.
- Conducted community detection based on modified fast unfolding algorithm.
- Designed a heterogeneous recommendation system via link prediction algorithms (including Neural Collaborative Filtering and Factorization Machine).

Characteristic analysis of complex networks — Jul 2018 - Jan 2019
Advisor: Prof. Zhongzhi Zhang, Fudan University

- Analytically derived the Laplacian spectrums of several special scale-free complex networks with identical degree sequence.
- Calculated characteristic invariants (including the spanning trees enumeration) of the studied complex networks related to consensus problem.
- Obtained the relationship between power-law degree distribution and consensus behavior on scale-free networks via the differences between fractal and non-fractal complex networks.

Design of advanced two-dimensional electronics Jun 2018 - Oct 2018
Advisor: Prof. Xiaodong Xu, University of Washington

- Fabricated Van der Waals heterostructures up to seven layers.
- Built dual-gated tunnel junctions based on few-layer h-BN and few-layer CrI_3 as tunneling barriers and investigated the Landau level quantization of monolayer graphene contact.
- Built magnetic tunnel junctions based on novel ferromagnetic electrodes Fe_5GeTe_2 and explored its thickness-dependent hysteresis.

Investigation on physical properties of innovative nanodevices May 2017 - Oct 2018
Advisor: Prof. Faxian Xiu, Fudan University

- Discovered a new type of quantum Hall effect in wedge-like Cd_3As_2 thin films (see Publications).
- Explored proximity-induced Fermi-arc superconductivity in Nb/Cd_3As_2 heterostructures and supercurrent in Nb/Cd_3As_2/Nb Josephson junctions (see Publications).
- Fabricated $NbSe_2$/WTe_2 hybrid structures and investigated the proximity-induced superconductivity in topological Weyl materials (see Publications).

PUBLICATIONS

R. Liu, C. Subakan, A. H. Balwani, J. Whitesell, J. Harris, S. Koyejo, E. Dyer. "A generative modeling approach for interpreting population-level variability in brain structure", currently under review in **MICCAI**, Mar. 2020.

C. Huang, B. Zhou, H. Zhang, B. Yang, **R. Liu**, et al. "Proximity-induced surface superconductivity in Dirac semimetal Cd_3As_2", **Nature Communications**, May 2019.

C. Zhang, Y. Zhang, X. Yuan, S. Lu, J. Zhang, A. Narayan, Y. Liu, H. Zhang, Z. Ni, **R. Liu**, et al. "Quantum Hall effect based on Weyl orbits in Cd_3As_2", **Nature**, Jan. 2019.

C. Huang, A. Narayan, E. Zhang, Y. Liu, X. Yan, J. Wang, C. Zhang, W. Wang, T. Zhou, C. Yi, S. Liu, J. Ling, H. Zhang, **R. Liu**, et al. "Inducing Strong Superconductivity in WTe_2 by Proximity Effect", **ACS nano**, June 2018.

AWARDS AND HONORS

Cox Fellowship from Georgia Tech	2019 - 2020
China National Scholarship | highest undergraduate scholarship nationally	2018
Chun-Tsung Scholar | honored by Chinese Undergraduate Research Endowment (CURE) awarded to less than 400 undergraduates nationally since its foundation	2018
First Prize of Outstanding Students Scholarship from Fudan | awarded to top 5%	2016
Outstanding Leadership Awards | honored to 10 student activity organizers per year	2018

PROFESSIONAL EXPERIENCE

Reviewing sub-reviewer of The Association for Computational Linguistics (ACL) 2020 Spring
Teaching Graduate Teaching Assistant (GTA) at Georgia Institute of Technology 2019 Fall
Introduction to Signal Processing at Electrical and Computer Engineering

SKILLS

Programming Languages	Python, MATLAB, SQL, C/C++
Open Source Libraries	PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, Gensim, etc.