Pingbang Hu

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EDUCATION

University of Michigan – College of Engineering — Michigan, U.S.A.
Bachelor of Computer Science — *Aug. 2021 - May. 2023*

University of Michigan – College of Literature, Science, and the Arts — Michigan, U.S.A.
Math Minor; Real/Complex/Stochastic Analysis, Optimization Theory, Topology, etc. — *Aug. 2021 - May. 2023*

Shanghai Jiao Tong University – UM-SJTU Joint Institute — Shanghai, China
Bachelor of Electrical and Computer Engineering — *Aug. 2019 - May. 2023*

RESEARCH EXPERIENCE

Network Failure Detection — CoE, UMich, Michigan, U.S.A.
Undergraduate Researcher — *Mar. 2022 - Present*
- **General**: Understanding the compact cuts representation and their implication on network failure detection.
- **Balanced Separator**: An improved algorithm on finding small balanced separator in almost linear time.

A Universal Law of Separability via GCN — SI, UMich, Michigan, U.S.A.
Undergraduate Researcher — *Feb. 2022 - Present*
- **General**: Theoretical analysis toward understanding the success of non-i.i.d. semi-supervised node-level tasks.
- **Separability**: Identify the separating condition of a 1-layer GCN on worst case real-world data the very first time.

Deep Learning Foundation — CoE, UMich, Michigan, U.S.A.
Undergraduate Researcher — *Mar. 2022 - Present*
- **General**: Fundamental understanding of deep neural network with theoretical analysis supported by SURE Program.
- **Manifold Hypothesis**: Characterizing the interplay between intrinsic dimension and the isoperimetry assumptions.

Travel the Same Path: A Novel Approach — CoE, UMich, Michigan, U.S.A.
Independent Researcher — *Jan. 2022 - Apr. 2022*
- **General**: Using imitation learning to speed up deterministic algorithm while maintaining the exactness of the solution.
- **Derandomized**: Demonstrate a potential next step of using AI to solve combinatorial optimization without approximation.

TEACHING EXPERIENCE

EECS475 Introduction to Cryptography — CoE, UMich, Michigan, U.S.A.
Instructional Aide — *Jan. 2023 - May. 2023*
- **General**: Hold discussion & office hour weekly for an upper-level 100+ student course on the main CS track.
- **Topics**: Focuses on historic ciphers, symmetric encryption (pseudo-random generators, stream ciphers, pseudo-random functions/permutations), message authentication, cryptographic hash functions, and public key encryption.

EECS572 Randomness and Computation — CoE, UMich, Michigan, U.S.A.
Instructional Aide — *Aug. 2022 - Dec. 2022*
- **General**: Hold discussion & office hour weekly for a graduate-level 70+ student course on the M.S. theory CS track.
- **Topics**: Focuses on randomized algorithm and complexity, pseudo-random generator, applications in cryptography.

VV285 Honor Mathematics III — UM-SJTU JI, SJTU, Shanghai, China
Instructional Aide — *Mar. 2021 – Aug. 2021*
- **General**: Hold discussion & office hour weekly for a 150+ student rigorous analysis course on the main B.S. ECE track.
- **Topics**: Focuses on linear algebra theory, topology, potentials and vector fields, higher derivatives, Riemann integral in $\mathbb{R}^n$, integration on curves and surfaces, Green, Stokes and Gauß theorem.
- **Competition**: Hold the 1st UM-SJTU JIntegration Bee competition.

VV186 Honor Mathematics II — UM-SJTU JI, SJTU, Shanghai, China
Instructional Aide — *Sep. 2020 – Dec. 2020*
- **General**: Hold discussion & office hour weekly for a 200+ student rigorous analysis course on the main B.S. ECE track.
- **Topics**: Focuses on one-variable real analysis, e.g., set theory, construction of $\mathbb{R}$, ϵ-δ definitions, uniform continuity, etc.

SELECTED HONORS AND AWARDS

Hong Kong, Macao and Taiwan Overseas Chinese Student Scholarship — SJTU, Shanghai, China
First Prize (Ranked #2) among all HK, MC and TW students in SJTU — *Oct. 2021*

Undergraduate Excellent Scholarship — SJTU, Shanghai, China
Third Prize among all students in UM-SJTU JI — *Nov. 2020*

Bao Gang Excellent Scholarship — SJTU, Shanghai, China
Second Prize (Ranked #3) among all Taiwan students in SJTU — *Jun. 2020*

Hong Kong, Macao and Taiwan Overseas Chinese Student Scholarship — SJTU, Shanghai, China
First Prize (Ranked #1) among all HK, MC and TW students in UM-SJTU JI — *Dec. 2019*