TUSHAR PANDEY

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SUMMARY

I am a mathematician with six years of research experience in geometric topology and a passion for data science. I have won several data science competitions over the years using my programming and analytical skills. I am looking for data science roles to leverage my skills and exposure to statistical analysis.

TECHNICAL SKILLS

Languages: Python, R, Qiskit, SQL **Tools**: AWS, MS-Suite, LaTeX, zx-live, Anaconda, MATLAB, Pandas

SELECTED EXPERIENCE

Doctoral Mathematics Researcher, Texas A&M University 2019 – Present

- Developed theories to study hyperbolic manifolds using Quantum Topology and Hyperbolic Geometry.
- Communicated effectively with experts and non-experts, as evidenced by 15 Invited academic talks.
- Mentored Undergrad students in topics like optimization, automated hedging, topological data analysis, etc.

Graduate Summer Intern, Oak Ridge National Labs Summer 2021 & 2022

- Devised a quantum error correction algorithm for the doubled Semion model inside a qudit Toric Code.
- Proposed the concept of topological phase transitions to enable fault-tolerant universal quantum computing.
- Presented the fundamentals of Topological Quantum Computing to a team of scientists at the National Lab.

Data Analyst Intern, Credit Suisse Summer 2018

- Built and tested a model for different VaR (Value at Risk) moves using linear programming and optimization.
- Documented C# code for different risks corresponding to FRTB methodology in a company-specific framework.

SELECTED PREPRINTS

- The Bonahon-Wong-Yang volume conjecture for the four-puncture spheres, ArXiv: 2311.13151
- Geometry of FSL complements and applications to the 1-loop conjecture, (with K.H. Wong) ArXiv: 2308.06643
- Topological Characterization with a Twist, Condensation, and Reflection, (with E. Dumitrescu) ArXiv: 2209.11126

SELECTED PROJECTS

- **Qualition,** Xanadu QHack, 2024
  - Improved circuit depth for quantum encoding of classical data by **85**% for image datasets.
  - Maintained an average fidelity of **95%** between the encoded image and the actual image suitable for QML.
  - Sequentially applied MPS preparation to encode 1080p image with **1400** depth and **92**% fidelity on **22** qubits.
- **Credit-Guard,** Erdős Institute, https://github.com/tanujmath/CreditGuard, 2023
  - Applied various **machine learning** models for biased datasets (1:12 class ratio) with a 0.85 AUC score.
  - Reduced the false positive rate by 15% and suggested 3 personalized features to improve for a better credit score.
- **Research on Academica**, TAMU Datathon (IInd), https://share.streamlit.io/pandey-tushar/tamids-22/main, 2022
  - Created impact score metric to measure the performance of different teams along with **NLP** techniques.
  - Analyzed over 10,000 research papers and 5,000 citations from 100 universities using text mining.
- **A Voyage into US-Elections**, TAMU Datathon (Ist), https://ritesh-tamids2021.streamlit.app/, 2021
  - Computed ROI metric to optimize the expenditure efficiency of parties and designed an **interactive website**.
  - Visualized over 20,000 data points from all 50 states over 12 years using the Plotly and Streamlit framework.

LEADERSHIP EXPERIENCE

Organizing Committee, Derivative and Integral Bee, Texas A&M University 2019 - Present

- Framed Questions for all students of all categories and helped in the conduction of the event every year.

Vice Captain, Basketball Team, Indian Institute of Technology, Kanpur 2017 - 2018

- Nurtured juniors with the spirit of sportsmanship and assisted the captain in conducting meetings.

EDUCATION

Ph.D. in Mathematics, Texas A&M University (USA), GPA 4.0 2019 – 2024

Dissertation Topic: Quantum Topology, Hyperbolic Geometry

Courses: Data Science, Compressed Sensing, Algorithms, Approximation Theory, Deep Learning, Quantum Computing

B.S. in Math and Computing, Indian Institute of Technology (India), GPA 3.3 2015 – 2019