Manupriya Gupta | Curriculum Vitae

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Academic Qualifications

- **Bachelor of Technology in Computer Science and Engineering** 2018 - present
  Indian Institute of Technology (IIT) Delhi CGPA: 8.762/10
- **C.B.S.E. Class XII** (2018) The Mother's International School, New Delhi Percentage: 94.2%
- **C.B.S.E. Class X** (2016) The Mother's International School, New Delhi CGPA: 10/10

Research/Work Experience

Robust Federated Learning for Fault Mitigation at Edge Nodes *Jul 2021 - present*

Prof. Huzur Saran, Prof. Rajeev Shorey : Department of Computer Science and Engineering, IIT Delhi

- Devised a fault mitigation strategy based on latency, computational power and load parameters for Edge Devices, 20% faster than other other Federated Learning Models like FedAvg for CNNs like AlexNet and ResNet
- ***Key Outcome***:
  - **Gupta, M.** et al. *FedFm: Towards a Robust Federated Learning Approach For Fault Mitigation at Edge Nodes* in ***14th Intl. Conference on Communication Systems and Networks (COMSNETS) 2022***. arXiv:2111.01074[cs.LG].

Dynamic Imputation of Cloud Cost and Derivation of higher efficiency for Service providers *May - Aug 2021*

Dr. Atanu Sinha, Dr. Shiv Kumar Saini :* Adobe Systems India *Research Lab, Bangalore

- Derived the best among 60+ usage metrics for fairer attribution of cloud cost of 20+ services and 200+ tenants
- Devised method to reduce cost by up to 70% using a **Cost-Performance trade-off** model at 15 min granularity
- Developed Time-Series forecasting model for **Cost of Goods Sold (COGS)** with 95% accuracy on **Azure** metrics
- ***Key Outcomes***:
  - **US PATENT** *Cost-based and Performance-based underutilization measure for effective cost monitoring**
  - **US PATENT** *Imputation of Service-Tenant Cost for Managing COGS**

(* : both patents in filing process)

Robust training of Deep Bayesian Neural Networks in Noisy settings *May - June 2020*

Prof. Steve Kroon : Computer Science Division, Stellenbosch University

- Designed experiments to compare novel technique of **Self-Stabilising Priors** (iterative updating of priors based on **Regularization** and **Variational Inference**) with algorithms like Flipout and Adversarial Defence
- Recorded 76% **variance reduction**, 16% lower performance time and convergence of models at 1000 epochs
- ***Key Outcome***:
  - Improved Mathematical proofs and Code Base in ICML-reviewed *research work* on **probabilistic modelling**

Scholastic Achievements

- **Google Women Tech Makers Scholarship**: Selected among 70 excellent undergraduates in APAC *2020*
- **Student I-4 Challenge IIT Delhi**: honored by Industrial R&D unit for best Ideation and Innovation work *2020*
- **All India Rank 220 in Joint Entrance Examination (IIT-JEE) Advanced** and ranked in Top 15 among girls *2018*
- **All India Rank 492 in Joint Entrance Examination (JEE) Mains** among 1.5 million candidates *2018*
- **K.V.P.Y. Fellowship**: Secured All India Rank 51 and awarded fellowship by I.I.Sc. Bangalore *2018*
- **National Standard Examination** in Chemistry & Physics: National Top 1% in olympiads by B.A.R.C. *2017*
- **Grand Masters in Mental Arithmetic** Certificate by Aloha International *2014*

Academic Projects

PINTOS Project ***(Prof. Kolin Paul, Operating Systems)*** *Apr 2021*

- Built an Operating System prototype using base code in C adapted from PINTOS **Stanford source**. Implemented **System Calls** (File Management Library) and priority-based Multi-Thread Architecture with Alarm Scheme

Artificially Intelligent Pacman *(Prof. Rohan Paul, Artificial Intelligence)* *Dec 2020*

- Designed a 2-player Pacman game (taking **Berkeley Pacman Project** as base) with adversarial maze search techniques like expecti-minimax and alpha-beta pruning for intelligent and time-bound decision making

Decision Trees and Random Forests *(Prof. Parag Singla, Machine Learning)* *Nov 2020*

- Implemented recursively growing Decision Tree on **FMNIST** obtaining 97% accuracy, augmented with top-down **pruning** to get 5x faster results. Implemented Random Forest using scipy after **one-hot-encoding** of raw data

Segmented Big Data Transfer (*Prof. Aaditeshwar Seth, Computer Networks)* *Nov 2020*

- Implemented Load Balancing to download 800 MB data using multiple **TCP** connections to a private server

Co-curricular Activities

- **Chairperson, ACES-ACM** (Official **ACM student chapter** and CS Dept Society of IIT Delhi) *Apr 2021 - present*
  - Chief Curator of techno-cultural events for CS students like coding contests and interactive sessions
  - Organizer of competitive events in CS and Mathematics in Annual Technical Festival with 45K+ participants
  - Head of welfare of CS undergraduates with focus on promoting female students and their mentoring
- **Teaching Assistant**: COL226 ***Programming Languages*** course, IIT Delhi *Spring 2022*
  - grading assignments, taking tutorial lessons and doubt-clearing sessions for 130+ second-year students
- **Teaching Assistant**: MTL100 ***Calculus*** course, IIT Delhi *Fall 2021*
  - grading assignments, taking tutorial lessons and doubt-clearing sessions for 1000+ first year students
- **Each One Teach One** Drive 2017: academically mentored a middle-school student from a financially weak family from which she improved marks in English and Mathematics by 30% at school within 1 month
- **Sportech**: part of institute ***Lawn Tennis*** Team for inter-college national event and reached Round 2 *Mar 2019*
- **TechFest IIT Bombay**: *Dec 2018*
  - Built manually controlled robot using L298 circuiting for motion and grip. Programmed ARDUINO in C++
  - Qualified among 10 best teams from ***Robotics Club*** to represent IIT Delhi at COZMOCLENCH National Event

Publications and Patents

1. Gupta, M., Goyal P., Verma R., Shorey R., Saran H. (2021). *"FedFm: Towards a Robust Federated Learning Approach For Fault Mitigation at the Edge Nodes"*. arXiv: 2111.01074 [cs.LG].
2. "Cost-based and performance-based underutilization measure for effective cost monitoring" - *US patent to be filed*
3. "Imputation of Service-Tenant Cost for Managing COGS" - *US patent to be filed*

Technical Skills

Programming C/C++, Python, Java, SQL, MATLAB, Octave, OCaML, Prolog, Javascript, Flutter, MIPS
Libraries/Tools TensorFlow, PyTorch, Scikit, Statsmodels, Vivado, Arduino, QTSpim, Flask, Latex, lex-yacc, Git

Relevant Coursework

Computer Science Discrete Mathematics, Computer Networks, Artificial Intelligence, Machine Learning, Parallel and Distributed Programming, Operating systems, Data Mining*, Data Structures and Algorithms, Analysis and Design of Algorithms, Computer Architecture, Programming Language Paradigms, Digital Logic, Wireless Networking*

Mathematics Linear Algebra and Differential Equations, Probability and Stochastic Processes, Algrbra, Calculus, Statistical Methods*

(∗ : will be completed by May 2022)