Inder Preet | Curriculum Vitae

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Brief Bio

Experienced data scientist with 5 years of expertise in delivering high quality AI/ML solutions to industries and for applied research. Skilled in leading projects, fostering collaboration and mentoring juniors. Proven ability in aligning projects with business objectives through strong communication with both technical and non-technical stakeholders. Always interested in learning and contributing to new algorithms and models.

Work Experience

- **Senior Data Scientist**, Jun, 2022 - Present
  Center for Intelligent Power, Eaton
  - Working on energy management in buildings controlling electrical assets to fulfil user objectives. Lead the efforts to clarify requirements from the stakeholders, designing experiments and creating an interface for the optimizer generalized for other problems. Created new metrics for evaluating performance and also contributed to code.
- **Data Scientist**, Oct, 2018 - May, 2022
  CeADAR - Ireland's Centre for Applied AI, UCD, Ireland
  - Lead a project on Privacy Preserving Machine Learning, educating companies by creating pedagogic videos and researching synthetic data generation using differential privacy.
  - Proposed and lead a project, Edge AI which was chosen after being vetted by many companies. Led it and also supervised an intern, creating a technology demonstrator. Patented the findings and also published a paper.
  - AI for Earth Observation, worked in a team creating a technology demonstrator for segmentation in satellite images. Also, did a project with European Space Agency and developed standards and specifications for Earth Observation data.
  - Solely completed a project on time series analysis, using telecom data on a work secondment using Vodafone's data. Anomaly detection, forecasting and predictive maintenance were studied.
- **Data Science Intern**, Nov, 2017 - Oct, 2018
  BrightWind Analysis, NovaUCD, Ireland
  - Coded and released an open-source python library for wind resource assessment, the first of its kind. Managed, end-to-end testing and release and also wrote documentation for the library `https://github.com/brightwind-dev/brightwind`.
- **Research Associate**, Jun, 2016 - Aug, 2017
  DE Shaw Research, Hyderabad, India
  - Helped scientists in literature reviews and operations of the lab. Tripled time efficiency for finding relevant literature by analysing the data and automating processes.

Patent

- I Preet, D John and O Boydell, "Class-Separation Preserving Pruning method for Neural Networks". Patent application filed on 14/12/2021, GB 2118066.6.

Publications

- I Preet,O Boydell, D John, "Class-Separation Preserving Pruning for Deep Neural Networks", **IEEE Transactions on AI, 2022**.
- AK Ramasubramanian, R Mathew, I Preet and N Papakostas, "Review of Edge AI solutions for mobile collaborative robotic platforms and applications", Under review for **55th CIRP Conference on Manufacturing Systems**.
- A McKinstry, O Boydell, Q Le, I Preet, J Hanafin, M Fernandez, A Warde, V Kannan, P Griffiths, "AI-Ready Training Datasets for Earth Observation: Enabling FAIR data principles for EO training data.", **EGU General Assembly Conference Abstracts, 2021**.
- I Preet and S Holleran, "Open-source Python library for wind data processing.", **Wind Europe Conference, 2019**.
- I Preet, A Ashraf and D John, "Anomaly Detection in heartbeats using modified auto-encoders". In prepration.

Skills

- **Programming Languages, Libraries and Software:** Python, C++, C, Verilog (beginner), Matlab, Pytorch, Tensorflow, OpenCV, Pandas, numpy, scipy, git.
- **Advanced courses taken:** Advanced Machine learning, Digital Embedded Systems, Parallel and High Performance Computing, Numerical Algorithms, Stochastic Modelling, Digital and Analog Electronics, Big Data Programming (Spark, SQL, Relational databases).
- **Languages:** English, Hindi and Punjabi.

Education

- **M.Sc. Computational Science**, 2017 - 2018
  University College Dublin, Ireland, 3.8 GPA (out of 4)
- **B.Sc. (Hons.) Physics**, 2013 - 2016
  St. Stephen's College, Delhi, India, 84% (Among top 10)
- **Class 12, ISC**, 2012 - 2013
  St. Mary's School, India, 96% (District topper)

Awards and Positions Held

- Robotics Officer, University College Dublin, 2017-2018. Organized tutorials in electronics and robotics.
- Mohan Katyal Memorial Prize for all round achievement, 2016.
- Awarded Prof. Nagpaul Fellowship for application of semi-markov modelling to industry, 2015-2016.

- Elected president of The Electronics Society, St. Stephen's College, 2015-2016. Designed electronic voting machines which were used in college elections and organized India's first drone racing competition.
- Among the top 10 % in National Graduate Physics Examination in India, 2013.

Data Science Portfolio

- **Privacy Preserving Machine Learning :** *Oct, 2021 - May, 2022*
  An ongoing project that involves researching into synthetic data generation that can provide privacy guarantees using differential privacy. An important part of the project is to educate new companies about different techniques for protecting privacy, by creating videos and organizing workshops: `https://www.youtube.com/watch?v=L8DjLVlFyZ8&list=PLdyP9rwOUXT2o8oobrMef7XUb_hKIBpbc`. Also, did a webinar for the same: `https://www.youtube.com/watch?v=IplUWA9fpUc`.
- **Hardware Software co-design for deep learning :** *Feb, 2019 - Sep. 2020*
  Planned the whole project, starting from a thorough literature review covering publications on DL accelerators, pruning, quantization and edge specific architectures. Based on the review, several companies voted for a longer project hence a web application was created where we implemented a complete pipeline for edge AI for the problem of arrhythmia detection in heartbeats running on a low power SoC. A novel modified auto-encoder was also designed to have a lightweight network for edge deployment. Information about the app can be found here: `https://www.ceadar.ie/pages/edgeai/`
- **AI Ready Earth Observation (AIREO):** *Jul, 2020 - Sept, 2021*
  Joint project between CeADAR, European Space Agency and Irish Center for High End Computing. Created standards and specifications for easy adoption of Earth Observation data by the Machine Learning Community, `https://www.aireo.net/`. Deep neural networks like U-Net and GANs were also designed and trained for semantic segmentation of satellite images, `https://www.ceadar.ie/pages/ai-for-eo`.
- **Time Series Analysis :** *Jan, 2019 - Oct, 2019*
  Techniques like Self-Organizing Maps, Dynamic Time Warping, time-series decomposition, deep neural networks, etc. were explored for automating anomaly detection and trend analysis for time-series of over a thousand variables. The variables were the KPIs from Vodafone Ireland's telecom networks and could be used to predict congestion and suggest maintenance and failures. Wrote a blog post describing some of the work: `https://sonalake.com/latest/applying-analytics-and-data-science-in-telecoms-network-congestion-forecasting/`.
- **Amazon Deep Racer Challenge :** *2019*
  Trained a deep reinforcement learning algorithm for racing on virtual tracks, also modeled the strategy to keep the robot car on track and maximize speed. The final racing time was amongst the fastest 100 in the world for Amazon Deep Racer Challenge, 2019 out of thousands of participants.
- **Long term assessment of wind resource at a site by hindcasting of data using Machine Learning:** *Master's Thesis, Apr - Aug, 2018*
  Support Vector Machines, Recurrent Neural Networks, etc. were explored for improving correlations in wind speed data. Some useful trends and hyper-parameter ranges specific to wind-energy were reported.
- **Semi Markov Modeling for Deteriorating Computer Systems with the study of performance and dependability :** *Prof. Nagpaul Fellowship, Bachelor's Final year project, 2016*
  Wrote code for sensitivity analysis of the semi-Markov model and created a simulation from first principles in the theory which could be used to test the model.