DRUMIL TRIVEDI

 github.com/drumilT drumilt.github.io drumiltrivedi@gmail.com

 Mumbai, Maharashtra, India (+91)-98203-20030

EDUCATION

Indian Institute of Technology- Bombay *[July 2017-August 2021]*
B.Tech (with Hons) Computer Science and Engineering *GPA 9.34/10*
Thesis Advisor: Sunita Sarawagi and Preethi Jyothi

PUBLICATIONS

Disfluency Correction using Unsupervised and Semi-supervised Learning 📄 *EACL 2021*
Nikhil Saini*,Drumil Trivedi* , Shreya Khare, Tejas Dhamecha, Preethi Jyothi, Samarth Bharadwaj

INTERNSHIPS

Diverse Question Generation to Improve Product Descriptions *[Summer 2020]*
Massachusetts Institute of Technology (MIT) CSAIL Guide: Darsh Shah , Prof. Regina Barzilay
- Worked on using **data augmentation** to generate multiple questions for a context on the Amazon Dataset.
- Formulated a **clustering** based side-information model to improve context for **diverse** question generation.
- Implemented variations of data representation to the state of art-
  · **BERT** for measuring relevance of a query cluster to product context, to select most relevant clusters.
  · **BART** model for generating diverse questions from product context and abstracted cluster information.

Efficient Compression of Deep Neural Networks *[Winter 2019]*
Institute of Science and Technology (IST) Austria Guide: Prof. Dan Alistrah
- Worked on approximate methods to calculate traces of large (second-order) **Hessian matrices**.
- Applied metrics based on **Hessian** matrix traces, OBD/Woodfisher for efficient reintroduction in the **RigL** method.
- Evaluated the metrics on networks like **ResNet** on **CIFAR-10** and matched with **state of the art** results.

Origin-Destination matrix prediction of Bike Sharing Services *[Summer 2019]*
Hong Kong Polytechnic University Guide: Prof. Edward Chung
- Organized the **Capital BikeShare Data** for its visualization as an **OD matrix** of various clusters of stations.
- Accounted for large data skews in the OD matrices using **geographically** weighted loss functions.
- Extensively applied **CNNs** on processed historical data, to achieve an accuracy of **91.1 %** for OD prediction.

ML Engineer *Tvarit Solutions UG* *[Winter 2018]*
- Developed a fast **multiphase hyper-parameter tuning model** for Random Forests using custom **functions**.
- Surveyed various **anomaly detection methods** and bench-marked the appropriate for the data.
- Adapted the **H2O Auto ML** platform for the data and integrated it with the **Amazon Web Services** pipeline.

WORK EXPERIENCE

Analyst- Quantitative Research & Trading *[June 2021-Present]*
Alphagrep Securities *Central Research Team*
- Implementing **latency sensitive** arbitrage strategies in **C++** in both simulation and deployment formats.
- Implemented an efficient **back-testing** platform for evaluating **Medium Frequency** signals.
- Researching various Medium Frequency signals that can complement High Frequency signals for market **Futures**.

MACHINE LEARNING EXPERIENCE

Among the **top 50** students selected to attend the **Google AI Summer School** for the NLU track. *[August 2020]*

Long Document/Speech ASR *[Autumn 2020 - Spring 2021]*
B.Tech Thesis Project, IIT Bombay Guide: Prof. Sunita Sarawagi, Prof. Preethi Jyothi
- Performed analysis on errors occurring in ASR systems for domain specific words for correction opportunities.
- Implemented **trie** based re-scoring on N-best lists for **domain specific** words and reduced overall WER by **1%**.
- Implemented state of the art paper **GLCLM**, improving on the first pass generated by standard ASR.

Disfluency Correction using Unsupervised and Semi-supervised Learning 📄 *[Spring 2020 - Summer 2020]*
CSALT Lab, CSE IIT Bombay and IBM Research Guide: Prof. Preethi Jyothi
- Processed the **Switchboard** dataset and made linguistic observations on distribution of disfluencies.
- Improved the **LSTM** based style transfer code, making **novel** use of pre-trained classifier embeddings.
- Implemented a **Transformer** based **style transfer** code and derived results.
- Familiarized and produced results on a state of the art **BART**, in a semi-supervised manner, for our setting.

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*Joint First Authors

Cognate Detection in Indo-European Languages 📄 *[Autumn 2020]*
CFILT Lab, CSE IIT Bombay   *Guide: Prof. Pushpak Bhattacharya*
- Scraped several online dictionaries to make a **WordNet** for **European languages**.
- Implemented **graph** based search methods to find potential cognates between Indo-European Languages.

Gender De-bias BERT Word Embeddings 🔗 *Course project*   *Guide: Dr. Diptesh Kanojia [Autumn 2020]*
- Implemented an **Auto-Encoder** model to remove inherent **gender-bias** in word embedding generated by BERT.
- Ensured meaning retention using re-construction loss, and gender retention in gendered terms using a classifier loss.
- The generated embedding yielded a **0.202(32%)** reduction on the WEAT score ($\uparrow WEAT \uparrow bias$).

Emotion Conditoned Text to Speech 🔗 *Course project*   *Guide: Prof. Preethi Jyothi [Autumn 2019]*
- Implemented the state of the art TTS model **WaveNet** to initially generate speech from text.
- Applied a **Seq2Seq model** that abstracts emotion & context from speech, to generate speech in the input emotion.
- Implemented a Generative Adversarial Network **GAN** to make speech more human-like sounding.

ROBOTICS

Autonomous Underwater Vehicle 🔗 *[Autumn 2017 - Spring 2019]*
Technical team   *Prof. Leena Vacchani, Prof. Hemendra Arya, IIT Bombay*
- Contributed in the designing of the electrical subsystem of the Matsya 5.0 (AUV) helping it reach the semifinals in **RoboSub 2018**, a global competition held each year in San Diego, California.
- As an Electrical Sub-Division Trainee
  - Implemented **CAN(Controller Area Network)** micro-controller communication protocol and worked with a higher level protocol for the same, integrating the various sensor and boards on the same line.
- As an Electronics Designer for the team :
  - Designed a **Back Plane**, a board **connecting all** systems in the vehicle: sensors, motors, power and computer.
  - Designed a **Battery Management System** for the efficient use of battery by the electrical subsystem.
  - Designed a robust **water seepage sensor** to prevent any damage to the electronics in case of a leakage.

SKILLS

Strong	C/C++, Bash, Python (with Tensorflow and Pytorch)
Familiar	HTML, CSS, Java, Javascript, Django, Racket, Arduino, VHDL
Tools and Software	Git, MATLAB, Wireshark, LaTeX, AutoCAD , Eagle

TEACHING AND MENTORSHIP

- **Teaching Assistant, IIT Bombay**
  - Computer Programming & Utilization for **Bodhitree** - Prof. Varsha A., Prof. Kameshwari C.   *[Spring 2018]*
  - Programming for Data Science for **C-MINDS**   - Prof Manjesh Hanawal, Prof Amit Sethi *[Autumn 2020]*
- **Chief Electrical Engineer-** *AUV-IITB Team*   *[Spring 2018]*
  - **Recruited and Mentored** 6 first-year students in sub-projects within the electrical division of the team.
  - **Showcased** the teams work in various Expositions to dignitaries, researchers and members of press.

MAJOR COURSES UNDERTAKEN

Machine Learning	Natural Language Processing, Organization of Web Information, High Performance Scientific Computing, Information Retrieval & Mining, Automatic Speech Recognition, Foundations of Intelligent & Learning Agents, Advanced ML, Advanced Topics in DL, AI & ML
Mathematics and Statistics	Linear Algebra, Differential Equations, Calculus, Numerical Analysis, Probability Theory, Derivative Pricing, Statistical Inference, Regression Analysis

ACHIEVEMENTS AND SCHOLARSHIPS

- Awarded **Institute Academic Prize** for exceptional academic performance among all freshman.   *2017-18*
- Ranked in the top **0.7%** of 0.2 million in **JEE-Advanced** and **466** in **JEE-Mains** of 1.2 million applicants. *2017*
- Received **KVPY Fellowship** with a national rank of **288** for exceptional scientific aptitude by Govt. of India.*2015*
- Cleared **Regional Mathematics Olympiad** and appeared for National Mathematics Olympiad **(INMO)**. *2014*
- Scored **99th + percentile** in **Mensa IQ Test** and hence became a part of the Mensa High IQ Society.   *2016*

EXTRACURRICULAR ACHIEVEMENTS

- Successfully completed a 15-day **Mountain Adventure Course** conducted by JIM & WS in Sanasar, Jammu.
- Awarded **All Round Excellence Award** by GokulDham High School, in 2014, for multiple achievements.
- Been an **Ambassador of Peace** (one of the 10 students from India) at the **Seeds of Peace** International Camp in USA,2013) and a part of **Paradigm Shifter(PS)** Advanced Leadership Program (2016) at Cyprus.
- Won the **Robot Game Challenge** on the District Level, in the FLL Food Factor Challenge 2012.