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Tushar Gupta

Fifth Year Dual Degree Student

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Education

Integrated Dual Degree (**B.Tech & M.Tech**) | **Indian Institute of Technology, Kharagpur**
- **C.G.P.A** : **8.55** (Upto 8th Semester) | Major : **Chemical Engineering** | Minor : **Computer Science and Engineering**
- July 2013 - July 2018 (Expected)

Higher Secondary (Grade XII) | St. John's Sr. Sec. School, Kota (C.B.S.E)
- **Percercentage : 94.8** | All India Senior School Certificate Examination 2013 (AISSCE)

Secondary Education (Grade X) | St. Paul's Sr. Sec. School Kota (C.B.S.E)
- **C.G.P.A : 10/10 |** Secondary School Examination 2011 (SSE)

Academic / Research Projects

- **Clustering of Beta sheets using Novel Shape Descriptors | Feb 2017 - Ongoing**
  Guide : Prof. Pralay Mitra (CSE, IIT Kharagpur)
  - Worked on formulation of computational features to represent 3D protein structures for **classification**
  - Devised an unsupervised approach to determine the number of naturally occuring β-Sheet structures for **100,000 proteins**
  - Research aims to **assist** and **automate** the process of mapping new proteins to their correct class, fold, superfamily and family based upon their structure. Work on a research **publication** is in progress

- **Stochastic Optimal Control of Seeded Batch Crystallizer | Master's Thesis Project | July 2016 - Ongoing**
  Guide : Prof. Debasis Sarkar (Chemical Eng, IIT Kharagpur)
  - Implemented model predictive control using the **Stochastic Maximum Principle** to obtain particle size distribution of a batch seeded crystallizer
  - Incorporated uncertainties in process parameters using **Polynomial Chaos Expansions** and **Ito Processes** to maximise the objective function
  - Used Matlab to model and simulate the **Population Balance Equations** for deriving the optimal temperature profile

- **Word Sense Disambiguation for Rarely Occurring Terms | Natural Language Processing**
  Guide : Prof. Pawan Goyal (CSE, IIT Kharagpur)   Lab : **CNeRG - Complex Networks Research Group**
  - Developed framework to identify rules for predicting the meaning of an unknown word composed of it's root word and suffix to improve upon Distribution Semantic Models
  - Applied **Partial Least Squares Regression** in **R**, to learn vector representations from known information of root and suffixes
  - Trained **Skipgram** ([FastText](#)) and **PMI** (Pointwise Mutual Information) on the English Wikipedia Corpus to obtain word-embeddings

- **Named Entity Recognition for Microblogging | Machine Learning**
  - Performed **Extraction** and **Disambiguation** of named entities in tweets for identifying fields such as Person, Location and Products
  - Employed Category Information from **DBPedia/Freebase** to link the extracted entities to respective classes, as an additional feature for classification
  - Deployed a **Bag of Words** model over an annotated dataset resulting in a precision of **77%** for extraction, an increase from baseline by **4%**

- **Faceted Recommendation System for Research Articles (FeRoSA) | Information Retrieval**
  - Parsed over 100,000 research papers using Python **BeautifulSoup** Library to obtain a **citation network** (graph) of biomedical documents
  - Used **Random Walk with restarts** (algorithm) over the network to recommend the most suitable paper based on a user entered query paper
  - Assigned the output into multiple categories by including multi-label edges in the citation graph while parsing xml data

Internships / Experience

Deep Learning Research Intern | Edge Labs, Edge Networks, Bangalore | May 2017 - July 2017

- *Skill Identification for Job Descriptions (Word Sequence Classification)*
  - Fabricated a **domain independent** model to replace existing manual feature selection for extracting skill-sets from a job-description
  - Engineered a **Bi-LSTM** architecture in **Keras** for word sequence classification by incorporating word-embeddings
  - Achieved a **macro average precision** of **0.96** over 5 types of classes using the **Begin-Inside-Outside(BIO)** notation for sequences
- *Title Prediction for Resumes (Document Classification)*
  - Implemented **Attention Mechanism** over a text-encoding model for mapping resumes to similar job titles by programming **RankNet** architecture in **Pytorch.** Innovated a **Bi-LSTM** and **ConvNet** architecture for resume classification and increased the top-10-precision by **27%**.
- Integrated the above models with **Flask** micro-framework to deliver web services

KITES Summer Internship Program | ITC Ltd. | May 2016 - July 2016

- Worked on reducing **operation costs** and **improving efficiency** of a dairy production plant by analysing utilities such as Boiler, Refrigeration and Water Treatment Plant.
- Mitigated losses in consumption, yielding a projected savings of **INR 5,00,000 /- (USD 7800) per year**. Received a full time position as a **Pre Placement Offer** for meeting all deliverables on time and displaying excellent performance.

Scholastic Achievements

Stood among the **top 2%** in the **Joint Entrance Examination Advanced Examination** conducted by the Indian Institute of Technology	**2013**
Achieved **All India Rank - 1813** in **Joint Entrance Examination Mains** among 12 Lakh students	**2013**
Selected under the **Kishore Vaigyanik Protsahan Yojana (KVPY)** [translated to: Young Scientist Encouragement Scheme] fellowship program conferred by the **Indian Institute of Science Bangalore**	**2013**
Scored in the **top 10%** in **National Standard Examination Chemistry** by Homi Bhabha Center for Science Education, Tata Institute of Fundamental Research , Mumbai	**2013**
Secured **All India Rank 101** in **National Science Talent Search Examination** by Unified Council	**2010**

Skills

Programming Languages	• **Proficient** : Python, C, C++ • **Competent** : R, HTML5, CSS, PHP
Tools/Packages	Pytorch, Keras, TensorFlow, Elasticsearch, Flask, scikit-learn, IPython, MySQL
Softwares / Platforms	RStudio, Matlab, Git, Vim, XAMPP [PHP Dev Env], UNIX Environment(Linux)

Coursework

- Algorithms – I (Theory + Lab.)
- Programming and Data Structures (Theory + Lab.)
- Computer Aided Process Engineering (Theory + Lab.)

- Deep Learning
- Machine Learning
- Transform Calculus
- Switching circuits and Logic Design (Theory + Lab.)

- Natural Language Processing
- Information Retrieval
- Computational Biophysics
- Computer Architecture and Operating Systems*

  *   *To be completed before Graduation*

Extra- Curricular Activities

code.fun.do, Hackathon | 2015

- Developed a money splitting app in 2 - Day long **Hackathon** hosted by **Microsoft**
- The app helped in managing finances in group transactions, thus made lending and sharing money easier

Head, Student Welfare Group IIT Kharagpur | 2014-15

- Ensured efficient organization of **Programming and Data Structures Doubt Sessions** for first year students in collaboration with the **Computer Science and Engineering Department, IIT Kharagpur**
- Organized **R – Programming Workshop** along OrangeTree Global with over 200+ student participation
- **Developed** institute's **Fresher's Forum** for student doubts and **Official SWG website :** *www.swgiitkgp.in*
- **Promoted** as the **Advisor** and the overall head for the subsequent years of operation