Kumar Saunack

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IIT Bombay
Computer Science & Engineering
B.Tech. with Honors
CPI : 8.72 / 10

Summary & Strengths

- Worked on **Deep NN** models and other **ML** models for Bachelor's Thesis, R&D and other projects
  · Specialising in Language models in Natural Language Processing - published a workshop paper
- Used **Blockchain** technology to create tamper proof databases
- Worked on **embedded systems** and embedded programming on Arduino
- Experience in full-stack web and Android **app development** - using Django + ReactJS stack
- Experience in collaborating and feature development on **open-source** and **large codebase** projects

Work Experience

Call flow analysis and segmentation *ProdigalTech, CA* *Summer 2019*

- Worked on unstructured call data to formulate methods to provide automated analytics, services to call-centres
- Developed innovative algorithms for call segmentation and automated identification of subtopics in a call
- Used **HMM**s and **Reinforcement Learning** approaches to obtain over **90%** precision in identifying subtopics
- Trained **Bayesian models** to identify noun chunks from the call segments to extract useful information

Developing and maintaining toolkits for phylogenetics *BDI, Oxford University* *Summer 2020*

- Working with collaborators across different teams to develop and maintain toolkits for phylogenetics
- Refactoring and adding features to the existing code in msprime and tskit on Python and C

R&D

Morphological Analysis for Indian Languages using NN *Bachelor's Thesis* *2020-*

- Using word embeddings of all words in a given language to identify the lemmas of a given word
- Analysing the reverse problem of identifying different forms of a given word given the embeddings

Word Embeddings for Indian Languages *Bachelor's Thesis* *2019-2020*

- Worked on generating word embeddings for **14** low-resource Indian languages. Created a total of **436** contextual (**BERT, ELMo, XLM**) as well as non-contextual (**FastText, GloVE, Word2Vec**) models for the same
- Evaluated the generated embeddings on XPoS and UPoS tagging tasks along with NER detection task

Exploring segmentation in malaria infected cells *R&D project* *Spring 2019*

- Devising neural networks to improve the accuracy of existing methods for segmenting infected cells
- Experimented with mixing **watershed transforms**, **morphological operations** to improve the detection

New RAN architecture for 5G *Research Internship, NUS* *Summer 2018*

- Virtualized data plane of **OpenAirInterface** to allow exibility in cellular networks for newer internet use-cases, like **IoT**, to build a requirement-aware architecture to boost network performance in each use-case
- **Parallelised over 70%** of the processing in OAI codebase to slice LTE stack from the physical layer onwards

Publications

A Passage to India: Pre-trained Word Embeddings for Indian Languages

- Kumar Saurav, **Kumar Saunack**, Diptesh Kanojia, Pushpak Bhattacharyya
- Workshop paper, LREC 2020

Key Projects

Spotify Skip Prediction Challenge *Autumn 2019*

- Improved user response prediction by using incremental learning and custom session and playback embeddings
- Achieved **67%** accuracy on a test set, comparable to the accuracy of the top performer (65%) of the challenge which was evaluated on a hidden test set

Text to Image Synthesis using GANs *Autmun 2018*

- Trained a DL-network to synthesize **artificial images** of flowers based on their textual descriptions
- Used **Conditional GANs** with **Deep Convolutional GAN** with **Skip Thought Vectors** for embedding

Low budget swarm robots using IR sensors *Summer 2017*

- Produced **small** and **low-budget**, Arduino based **swarm bots**, each fitted with 12 infrared sensors onboard
- Developed a custom algorithm for robots to determine heirarchy,take **feedback** and **synchronise movements**

Data integrity using Blockchain *Autmun 2018*

- Creating blockchain based distributed **tamper-resistant** ledger with minimal changes to existing schema
- Used **Multichain** to produce cheap, reproducible, reliable blockchain-based distributed tamper-resistant ledger
- Performing integrity checks on the database on each query using blockchain ledger to **detect insider attacks**

Railway controller system over FPGA *Spring 2018*

- Built a railway grid signal controller over multiple FPGA boards with **encrypted channels** using **VHDL**
- Used FPGA comm link and **UART** to communicate with backend and synchronise with other controllers

Local file sharing system *Autumn 2017*

- Created a software which facilitates quick and easy two-way file sync and share system over local networks
- Created the front and backend using **Django** and used **ReactJS** to make the sites dynamic for improved UX

Cryptography Suite *, Course Project* *Autumn 2016*

- Implemented **RSA** and **Diffie-Helman key exchange** algorithms over **Elliptic and polynomial fields**
- Implemented algorithms like **Miler-Rabin Test**, **Baby-Step-Giant-Step** algorithm, Discrete Log using GMP

Key Courses Undertaken

Data science	Deep Learning, Foundations of Intelligent and Learning Agents, Information Retrieval and Data Mining, ML and AI, Medical Image Computing, Data Analysis and Interpretation, Digital Image Processing
Algorithms & Data structures	Design and Analysis of Algorithms, Data Structures and Algorithms, Discrete Structures, Abstractions and Paradigms For Programming

Scholastic Achievements

- All India rank **8** and **6** in Nationwide Education and Scholarship Test (NEST) [2017,2018]
- All India rank **337** in JEE (Advanced) among 200,000 aspirants [2016]
- Awarded the **National Physics Olympiad Certificate of Merit** (top 1% nationwide) [2015]
- **National Astronomy Olympiad Certificate of Merit** (top 1% nationwide) [2015]
- Recepient of the **KVPY fellowship** by Government of India [2014]
- Awarded the **NTSE scholarship** by Government of India [2012]

Extracurriculars

Sports

- **Bronze** medalist (2016) and part of IIT Bombay Lawn Tennis team in Inter IIT Sports since freshman year
- Led IIT Bombay tennis team as **captain** in inter-college tournaments since 2 years
- Represented Bihar state twice in **Lawn Tennis Nationals** (2011-12), School Games Federation of India
- Awardee of the **Institute Sports Citation**, 2018 for contributions to sports at the institute level
- Winner of **Hostel Sportsperson of the Year**, 2018 for contributions to sports in Hostel 6, IIT Bombay

Positions of Responsibility

- **Teaching Assistant** for B.Tech. III - 'Logic for CS' (2019) under Prof. G. Sivakumar
- **Department Academic Mentor** - mentor of 6 sophomores for academic and general concerns 34 []2019-20]
- **Contingent Leader**, IIT Bombay - managed contingent of 117 students at InterIIT Sports Meet 2019
- **Sports Head**, Lawn Tennis, Aavhan 2019 - organised and managed a lawn tennis tournament during IIT Bombay's sports fests