Atharva Naik

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Interests

Natural Language Processing, Generation (Dialogue and Summarization) and Inference, Explainability, Computational Sociolinguistics, Deep Learning

Education

- **Indian Institute of Technology and Science** — Kharagpur, WB
  Bachelor of Technology in Computer Science and Engineering: GPA: 9.66/10.0 — *July. 2018 – July. 2022 (Expected)*
- **Shivashish High School** — Ahmedabad, GJ
  Higher Secondary Education in Science: 95.6% — *May. 2016 – May. 2018*

Experience

- **Technische Universität Darmstadt** — Ubiquitous Knowledge Processing Group
  Research Intern — Supervisor(s): Dr. Gozde Sahin, Dr. Nafise Moosavi — *Ongoing*
  - **Explainability using additive models**: Developing interpretability techniques based on additive models, for predicting relative contribution of parts of input on overall prediction for various NLP tasks like NLI, QA etc.
  - **Detecting artefacts in datasets**: Using relative contribution of parts of input to identify misleading patterns and artefacts that affect model behaviour.
- **Adobe** — Big Data Experience Lab, Bangalore, KA
  Research Intern — Supervisor(s): Dr. Niyati Chhaya, Suryateja Bulusu — *May 2021 - Aug 2021*
  - **AI for collaboration**: Built an RL agent and user interface for simultaneous collaborative colouring of line-art
  - **Dataset for colouring of line-art**: We scraped more than 250k flat colored images from coloring websites, vectorized images with photoshop scripts and extracted segments and corresponding colors using svg parsers
  - **User Simulator and RL agent**: Built a rule-based user simulator to simulate multiple users simultaneously coloring a line-art and a decision transformer architecture to resolve creative conflicts between artists.
  - **Frontend for live collaboration**: Twilio API for live collaboration, with conflicts being resolved by our agent
- **University of Alberta**
  Research Intern — Supervisor: Prof. Lili Mou — *May 2021 - Sep 2021*
  - **Explainable NLI**: Developed a weakly-supervised explainable phrase level reasoning system for NLI that uses fuzzy logic formulae to induce sentence level labels from phrase level labels for aligned phrasal chunks. We utilize only sentence label supervision while maintaining end-to-end differentiability
  - **Platform for Phrase Level Annotation**: Created a lightweight flask based website for phrase level annotation to create the test set for our approach. Features included a thesaurus, a progress dashboard and bookmarking
- **Autonomous Ground Vechicle Group** — IIT Khargapur, WB
  Undergraduate Student Researcher — *Feb 2019 - Mar 2020*
  - **Intelligent Ground Vehicle Challenge**: Path planning and localization in ROS for Eklavya 7.0
  - **Frenet Path Planner**: A C++ implementation of frenet frame algorithm for local path planning
  - **CARLA**: Environment for training RL algorithms using lidar, collision and camera data from CARLA simulator

Publications

- **Understanding the Role of Affect Dimensions in Detecting Emotions from Tweets: A Multi-task Approach** : SIGIR 2021, Rajdeep Mukherjee, Atharva Naik*, Sriyash Poddar*, Soham Dasgupta (* indicates equal contribution)
- **Weakly Supervised Explainable Phrasal Reasoning with Neural Fuzzy Logic**: arxiv preprint (under review), Zijun Wu, Atharva Naik, Zi Xuan Zhang, Lili Mou
- **Representation Learning for Conversational Data using Discourse Mutual Information Maximization**: (under review), Bishal Santra, Sumegh Roychowdhury, Aishik Mondal, Vasu Garg, Atharva Naik, Manish Gupta, Pawan Goya
- **CollabColor: Creative Support System for Human-Human Synchronous Collaboration**: (under review), Suryateja BV, Atharva Naik, Yash Parag Butala, Jeet Patel, Sristy Sharma, Niyati Chhaya

Projects

- **Multilingual Dialogue Understanding** Ongoing
  BTech project: A novel approach for multilingual dialogue understanding:
  - **Creation of multilingual dataset**: Scraping twitter to create a multilingual, open domain, dialog dataset
  - **Unified framework for multilingual dialogue**: Finetuning exisiting cross-lingual models on multi-lingual dataset with a generative loss. We also plan to build a single framework capable of handling multilingual dialogue.
- **Quantifying the Effect of Model Capacity on Datamaps** Oct 2021 - Nov 2021
  Investigating the effect of number of learnable parameters on the shape of data maps.
  - **Adding support for task adapters**: We added code to compute training dynamics for models with task adapters. We also investigated the impact of reducing number of learnable parameters, on training dynamics
  - **Evaluation framework for comparing data maps**: We extended the partitioning scheme defined in the original paper and developed metrics, to quantify the shift in the datamap of a given dataset for different models.
- **Headline Generation** Mar 7 - Mar 26, 2021
  Worked on headline generation for multilingual articles for Inter IIT Technology Meet.
  - **Variational Autoencoders for Diverse Summaries**: We adapted the method proposed by a research paper for leveraging variational auto-encoders for discourse level diversity to headline generation.
  - **Monolingual headlines for multi-lingual articles**: The source articles contained Hindi, English and Hinglish. We used translation and post-processing techniques to ensure that the generated headlines were in English.
- **Fine Grained Scheduling for Transformers** Feb 2021 - Apr 2021
  Leveraging stream level parallelism and kernel fusion to speed up forward pass of a BERT encoder.
  - **Batch level parallelism**: Parallelizing operations on tensors by leveraging CUDA stream API
  - **Improving Deepspeed BERT**: Incorporated aforementioned optimized multi-stream transformer operations into the forward pass of the BERT encoder implementation of Microsoft's Deepspeed framework.
- **Emotion Detection from COVID-19 Tweets** May 2020 - Jul 2020
  Analysis of emotion reactions of people to COVID-19 using tweets.
  - **Multi task training**: Hierarchical multi task training between real valued Valence Arousal Dominance dimension vector and categorical emotion based classifiers to leverage datasets using incompatible models of emotions.
  - **Aspect extraction and trend analysis**: Using unsupervised aspect extraction to understand emotional reaction of people to various topics corresponding to each emotion, to compare the relative importance of the topcis
- **Aspect Based Opinion Summarization** Mar 2020 - Apr 2020
  Survey of Aspect Based Opinion Summarization methods as group project for NLP course.
  - **Summarizing Tourist Data**: A survey of latest techniques in the domain of Aspect Based Opinion Summarization. Adapting a Multi-Document Mean Summarization approach for tourist data.
  - **Aspect Extraction on Medical and Tourist data**: Testing unsupervised aspect extraction methods on CORD dataset consisting of COVID-19 related research papers and tourist data.

Programming Skills

- **Languages**: Python, Javascript, C, C++, Bash, Scala, Verilog
- **Frameworks**: CUDA, OpenMP, MPI, OpenCV, WandB, PyQt5, Django, Flask, ROS, Git, Latex
- **Libraries**: PyTorch, Tensorflow, NLTK, sklearn, pandas, spacy, beautifulsoup, selenium

Academic Honours and Awards

- **MITACS Globalink Scholarship**: Awarded MITACS scholarship to intern at University of Alberta
- **DAAD WISE Scholarship**: Awarded DAAD-WISE scholarship to intern at TU Darmstadt
- **Inter IIT Technology Meet**: Was a member of the bronze medal winning contingent for IIT Kharagpur
- **Intelligent Ground Vechicle Competition**: Member of the Eklavya 7.0 team from IIT Kharagpur. Got 2nd place in the IGVC 2019. Worked on path planning and localization using Robot Operating System(ROS) framework.
- **Kishore Vaigyanik Protsahan Yojana (KVPY)**: Awarded fellowship for achieving all India rank 543.
- **Top 0.1% performance in Chemistry**: Awarded certificate for top 0.1% performance in board exams

Relevant Coursework

Natural Language Processing, Scalable Data Mining, Reinforcement Learning, Deep Learning, Machine Learning, Artificial Intelligence, Image Processing, High Performance Parallel Programming, Stochastic Processes in Finance, Probability and Statistics, Theory of Computation, Algorithms, Computer Organisation and Architecture, Computer Networks, Compilers, Operating Systems, Software Engineering

Other Projects

- **FigUI**
  A suite of commonly used GUI tools built using PyQt5.
  - **File viewing and editing**: A basic text editor, a code editor with features like syntax highlighting, search and code folding, using codemirror, pdf viewer using pdf.js, live editor-renderer for html, image viewer and editor, video player with python-vlc, 3D model (.stl) file viewer using python bindings for vtk and a simple file explorer.
  - **Commonly used applications**: Embedded terminal, Embedded chromium browser, calculator, analog clock, QR Code generator, task viewer, system dashboard (process/cpu info with psutil)
- **social_media: frontend scraping with selenium**
  Front end based scraper for popular social media platforms like instagram, twitter, youtube, quora etc.
  - **Automating posting and login**: Built routines to automate login and posting using frontend layout of pages.
  - **Profile and post scraper**: Scraping profiles and posts by automating search and scrolling for twitter
- **Tiny C compiler**
  Compiler for tinyC with x86-32 as the target architecture. Course project for Compilers course.
- **Organ Donor-Recipient Matcher**
  Software Engineering course project, implemented using Django.
  - **Donor-Recipient matching**: Utilized a greedy matching method to match Organ Donors and recipients using height, weight blood type and age. Email notifications are sent out to Donor and Recipient once match is found.
  - **Fundraiser with notifications**: A fundraiser feature for donating to families of recipients or donors.
  - **Blogging and simple text chat**: Blog with comments and a simple text chat between users.

Extracurricular Activities and Volunteering

- **Volunteering for NAACL 2021 conference**: Moderating for Oral Presentations and Poster Sessions.
- **Interested in language learning**: Casual learner of French and Japanese. Took French course in 4th semester
- **Filmmaking and Photography**: Member of the Technology Filmmaking and Photography society in the first year. Was involved in the shooting and production of Carpe Diem.
- **Karate and Martial Arts**: Learnt Goju Ryu karate from 6th to 11th grade. Reached golden brown belt (one step below black belt).