

# SHAMANTH R NAYAK K

[Email](#) ◇ [LinkedIn](#) ◇ [Github](#)

## OBJECTIVE

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My research interests hover around the intersection of Computational Linguistics and Explainable AI. I hope to work on Natural Language Processing and Theoretical Machine Learning.

## EDUCATION

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### Master's in Computer Science (Thesis),

Gina Cody School of Engineering and Computer Science, Concordia University, Canada

2022 - Present

GPA : **4.15/4.3**

Courses: Natural Language Analysis, Machine Learning, Conversational AI, Deep Learning

### Bachelor of Computer and Communication Engineering, Manipal Institute of Technology, India

2018 - 2022

CGPA : **9.75/10** ( as of seventh semester)

Minor in Big Data Analytics

Courses: Data Mining and Predictive Analysis, Advanced Design and Analysis of Algorithms, Social Network Analysis, Pattern Recognition, Human Computer Interaction, Mathematics.

## EXPERIENCE

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### Graduate Research Assistant

Concordia University

Sep 2022 - Present

*Quebec, Canada*

- Working on evaluating Large Language Models (LLMs) in various Discourse tasks.
- Leveraging LLMs for generating text that captures relevant aspects of various characters in a game.

### Software Engineering Intern

Cisco Systems India Pvt Ltd.

Feb 2022 - July 2022

*Bangalore, India*

- Worked in the Supply Chain Operations (SCO) unit of Cisco.
- The work involved closely collaborating with members of the Product Operation business unit and dealing with the management and new release of software products into the supply chain

### Mitacs Globalink Research Intern

University of Lethbridge

Jun 2021 - Oct 2021

*Alberta, Canada (Remote)*

- Worked under *Dr. Yllias Chali* on a project involving Text Summarization and Query Generation.
- The work mainly involved developing a novel method for both query-based extractive and abstractive text summarization along with beating the current state-of-the-art results. This comprised of literature survey relating to the same and implementation of different language models.
- Recipient of **The Globalink Graduate Fellowship** Award as a part of the completion of the internship that provides financial support (15000 CAD) for Graduate Studies at Canadian Universities.

### Research Intern

IBM Research

Sept 2020 - Jun 2021

*Bengaluru, India*

- Worked under *Mr. Balaji Ganesan* on explainability of Graph Neural Networks (GNNs) .

- The work involved extensive literature survey on GNNs and their applications in Entity Matching and Link Prediction. Completed a task that straddles both graph and tabular data using GNNExplainer and TabNet respectively.
- The results of this work were then presented at the **ICML 2021 Workshop on Theoretic Foundation, Criticism and Application Trend of Explainable AI**.

### Artificial Intelligence Expertise Head

Research Society MIT

Oct 2020 - Jun 2021

*Manipal, India*

- Served as the domain head for Artificial Intelligence. The organization's policy was aimed at facilitating the development of a research community that can work on projects, both interdisciplinary and otherwise.
- Mentored several young students regardless of their previous research background and affiliation to the organization along with paper discussion and alumni webinar sessions and guided them in working on different sub fields of AI, leading them to publishing their research.

### Data Analytics Intern (Trainee)

The Sparks Foundation

Aug 2020 - Sep 2020

*NSU Enterprise, Singapore (Remote)*

- Worked as a trainee being a part of the Graduate Rotational Internship Program for the duration of a month where the tasks involved the implementation of standard algorithms ranging from but not limited to regression, decision trees and support vector machines on various data sets along with exploratory data analysis.

## PROJECTS & PUBLICATIONS

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### IS CAM: Integrated Score Cam for Axiomatic-Based Explanations

[Preprint](#)

We achieve sharper attributions than the previous attempts by borrowing the idea of integration from "IntegratedGrad" and combine it with Score-CAM to conduct faithfulness evaluations in order to provide researchers with a tool to interpret models better. IS-CAM performs better than SS-CAM and Score-CAM in terms of faithfulness evaluations, considering the VGG-16 as our baseline model

### Improved variants of Score-CAM via Smoothing and Integrating

[Poster](#)

We improve Score-CAM by adding smoothing and integration functions as suggested in the SmoothGrad and IntegratedGrad papers respectively. (Accepted as extended abstract at [RCV](#) workshop at CVPR'21)

### Reimagining GNN Explanations with ideas from Tabular Data

[Preprint](#)

Explainability techniques for Graph Neural Networks still have a long way to go compared to explanations available for both neural and decision tree-based models trained on tabular data. Using a task that straddles both graphs and tabular data, namely Entity Matching, we comment on key aspects of explainability that are missing in GNN model explanations. (Accepted as a paper at [Theoretic Foundation, Criticism and Application Trend of XAI](#) workshop at ICML'21.

### Secure Sharing of Text Data Using Hybrid Encryption Algorithms in a Client-Server Model

[Paper](#)

We propose a model for secure transmission of data using hybrid encryption algorithms. This system uses a combination of features from public key encryption and symmetric key encryption. Accepted at [ICECCT'21](#) - International Conference on Electrical, Computer and Communication Technology.

### Traffic flow prediction Models- A review of deep learning techniques

[Paper](#)

Traffic Flow Prediction is the accurate estimation of traffic flow in a given region at a particular interval of time in the future. In this paper, we review some of the latest works in deep learning for traffic flow prediction by considering many deep learning architectures that include Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), Long Short-Term Memory (LSTM), Restricted Boltzmann Machines (RBM), and Stacked Auto Encoder (SAE). The manuscript has been approved for publication in **Cogent Engineering**.

## Generating Query Focused Summaries without Fine-tuning the Transformer-based Pre-trained Models [Preprint](#)

Fine-tuning the Natural Language Processing (NLP) models for each new data set requires higher computational time associated with increased carbon footprint and cost. However, fine-tuning helps the pre-trained models adapt to the latest data sets; what if we avoid the fine-tuning steps and attempt to generate summaries using just the pre-trained models to reduce computational time and cost. In this paper, we tried to omit the fine-tuning steps and investigate whether the Marginal Maximum Relevance (MMR)-based approach can help the pre-trained models to obtain query-focused summaries directly from a new data set that was not used to pre-train the models.

### Review Bay

[Link](#)

The project was based on the problem statement given by ISRO in Smart India Hackathon 2020. The developed application performed sentiment analysis evaluating the tweets into three main classes namely, positive, negative and neutral and provided a detailed analysis. Using the analytics that is provided, one can assess the feedback of certain quotes/ tweets corresponding to a topic useful for companies that value their reviews.

### Natural Language Processing Projects

[Link](#)

This set of projects were done on tasks like Named Entity Recognition to name entities in Twitter data sets, Sentiment analysis using Logistic Regression and Naive Bayes with the implementation of Locality Sensitive Hashing from scratch for Machine Translation. The work also involved POS tagging by implementing Markov chains and then used the hidden Markov model to implement the Viterbi Algorithm to tag parts of speech, N-grams to make a simple auto-complete model.

## CERTIFICATIONS

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### Neural Networks and Deep Learning

[Certificate](#)

### Natural Language Processing with Classification and Vector Spaces

[Certificate](#)

### Natural Language Processing with Probabilistic Models

[Certificate](#)

### Explore Machine Learning Models with Explainable AI

[Certificate](#)

### Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

[Certificate](#)

## EXTRA-CURRICULAR ACTIVITIES AND ACCOMPLISHMENTS

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- Secured **Second** place out of 32 teams at the *Smart India Hackathon* (2020) (College level).
- Secured **Second** place at *MIT Innovation Fest* 2020.
- **MITACS GRI Scholar** 2021 along with being a recipient of the *MITACS Global Graduate Fellowship* Award.
- Received the **Merit Scholarship** at Manipal Institute of Technology. (*For securing rank 1 out of 140 students with in academic years 2018-2019 and 2019-2020*)
- Recipient of the **Diamond Jubilee Scholarship** Award at Manipal Institute of Technology. (*For securing a CGPA of 9.61 for the academic year 2018-2019 and CGPA of 9.78 in the academic year 2019-2020*)
- Attended conference workshops at CVPR 2021 and ICML 2021.
- Core Committee member at **ACM** (Association for Computing Machinery) Manipal Student Chapter.
- Member at **Teach Code for Good** (*Teach Code for Good is an enthusiastic group of students in their second and third years of engineering at MIT who wish to impart education in basic coding and computer programming to ones who aren't fortunate of its access.*)
- Received the **Gold Medal** at Manipal Institute of Technology. (*For securing rank 1 out of 140 students with for the academic years 2018-2022 in Computer and Communication Engineering.*)

## **LEADERSHIP**

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- Expertise Head of the AI Subdivision (previously) and Mentor (now) of a group of undergraduate research enthusiasts at Research Society Manipal(RSM). Mentoring my juniors on Explainable AI and NLP projects.
- Mentor at ACM Manipal. I am currently guiding students who are interested in Artificial Intelligence.