

# KETAN KUMAR TODI

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## EDUCATION

### Manipal Institute of Technology, Manipal, India

July 2019

Secured a Bachelor of Technology in Computer Science and Engineering *with Distinction*

(CGPA 9.36/10)

Minor Specialization in Intelligent Systems

Ranked among top 5% in a class of 247 students (Rank: 13<sup>th</sup>/247)

Received Gold medal in 3<sup>rd</sup> semester for outstanding academic performance

Courses: Intelligent Systems Minor (Artificial Intelligence, Machine Learning, Natural Language Processing, Social Network Analysis), Data Structures and Algorithms, Database Management Systems, Operating Systems

## PROFESSIONAL EXPERIENCE

### Taiger Singapore Pte Ltd, Singapore

June 2019 - Present

*Applied Research Engineer - Natural Language Processing*

- Developed a semi-automatic ontology extraction (extracting domain terms and the relation between them) from free text using an entropy-based active learning NER model. Incorporated a coreference module, followed by relation extraction to extract words representing the relation between the named entities and relation classification to populate the knowledge graph.
- Implemented R-BERT paper which used special tokens to mark the named entities to guide relation extraction and relation classification between only those named entities which are marked in a sentence. Active learning approach reduced data requirement for NER, relation extraction and relation classification by 60%.
- Developed one shot classification module for chatbot intent classification achieving 85% F1 score on Chinese, Vietnamese and Arabic languages using pretrained LM's like Universal Sentence Encoder, BERT and ELMO.
- Developing trainable paragraph retrieval modules for end-to-end document question answering system.
- Developing information extraction system for legal documents which will be used for populating tables subsequently.
- Awarded as the best performer for 2019 in the Research and Development team of approximately 20 employees.

### Nanyang Technological University, Singapore

Jan 2019 - May 2019

*Research Assistant, NTU India Connect Programme, Final semester project, Professor TA Nguyen Binh Duong*

- Worked on Air Traffic Management using Reinforcement Learning and blockchain (Hyperledger Fabric) to develop RL based decentralized agents to assist the workforce in scheduling aircrafts (finding optimum departure and arrival time, to minimize the total delay at all airports) considering different weather and congestion factors.
- Incorporated private blockchain to decentralize the entire system across the airports of different countries and make the entire system transparent and secure.
- Showed that reward and actions decided by smart contract for different agents reduced total system delay more as compared to local optimization and local reward calculation.
- Reduced running time from 50 seconds to 4 seconds and distributed the entire system across multiple machines.

### International Institute of Information Technology, Hyderabad (IIIT-H)

May 2018 – June 2018

*Research Intern, Language Technologies Research Centre, Professor Manish Shrivastava*

- Worked on Semantic Textual Similarity (STS) for English language to predict how similar the 2 sentences are, where a score of 5 signifies they are the same sentence and a score of 0 signifies they are dissimilar.
- Developed a cross-sentence attention based neural network, achieving a PCC score of 0.76 as compared to the state-of-the art PCC score of 0.81 at the time of internship.

### International Institute of Information Technology, Hyderabad (IIIT-H)

Nov 2017 – Jan 2018

*Research Intern, Language Technologies Research Centre, Professor Dipti Misra Sharma*

- Developed part of speech tagging (POS – finding grammar tags for words) module for an Indian Vernacular language, named Kannada using Machine Learning (mainly CRF and SVM) and Deep Learning concepts.
- Used character embeddings in combination with word embeddings with bi-LSTM to handle Out of Vocabulary words.
- Achieved state of the art results of 92% F1 score which was 6% higher as compared to the previous results, with more POS classes.

## PROJECTS

### Sentiment Analysis – Research Project

October 2017 – December 2018

Professor Muralikrishna SN

- Developed a sentiment analysis model on IMDB movie-review dataset. Used k-means clustering to cluster sentences based on their relevance towards determining the final sentiment, where subjective sentences are more relevant than objective sentences in determining the final review.
- Allotted an optimum weight for each cluster to determine the relevance of the sentences in that cluster using neural network. 91% of sentences in the cluster with the highest weightage were subjective sentences.
- Achieved 91% F1 score on IMDB movie review dataset.

### Shopping and Inventory Management Desktop App – Course Project

April 2017

- Built a desktop application (using Java), providing a platform for sellers to maintain their products inventory. Customers can add products to the wish list or to the cart and place orders on the basis of availability of the products in the inventory. Used MySQL as the relational database in backend.

## PUBLICATIONS

### Knowledge Graph Generation with Deep Active Learning

Abhishek Pradhan\*, Ketan Kumar Todi\*, Anbarasan Selvarasu, Atish Sanyal

IEEE International Joint Conference on Neural Networks (IJCNN), WCCI, Glasgow, UK, 2020

### Decentralizing Air Traffic Flow Management with Blockchain-based Reinforcement Learning

Ta Duong, Ketan Kumar Todi, Umang Chaudhary, Hong-Linh Truong

IEEE International Conference on Industrial Informatics (INDIN), Finland, 2019

### Sentiment Classification of review Data Using Sentence Significance Score Optimization

Ketan Kumar Todi, Muralikrishna SN, Ashwath Rao B

International Journal of Data Analysis Techniques and Strategies (IJDATS) journal (In Press)

### Building a Kannada POS Tagger Using Machine Learning and Neural Network Models

Ketan Kumar Todi\*, Pruthwik Mishra\*, Dipti Misra Sharma

International Conference on Computational Linguistics and Intelligent Text Processing (CICLing), Vietnam, 2018

## SOFTWARE SKILLS

- Programming Lang: Python, C, C++, Java, Golang, MySQL
- DL Frameworks: Pytorch, Keras, Tensorflow
- Web Technology: ASP.Net

## EXTRA CURRICULAR ACTIVITIES

- Completed the following certified courses online: Coursera Deep Learning Specialization – by Andrew Ng in 2017-18 | Udacity Deep Learning Specialization in 2018.
- Won the ‘Manipal Intelligent Quotient’ organized by ISTE Club, Manipal – a national based logical reasoning competition – secured 1<sup>st</sup> position in 2016 and 2<sup>nd</sup> position in 2018.
- Actively participating in competitive coding competitions (Codeforces highest rating: 1662).
- Won the intra college team-based coding competition organized by IECSE Club, Manipal in 2018.
- Completed a 5-year drawing and painting course and a 2-year Piano course from Bangiya Sangeet Parishad (Fine Art Academy).