

Manas Jain

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RESEARCH INTERESTS

Text Generation, Conversational AI, Abstractive Summarization, Natural Language Processing, Computer Vision, Deep Learning, Machine Learning

EDUCATION

Indian Institute of Technology Bombay Mumbai, MH, India
Bachelor of Technology, in Civil Engineering July 2017-May 2021

- Dual Minor in i) Computer Science and ii) Machine Intelligence & Data Science (CMInDS)
- Major GPA : 8.7/10, CMInDS Minor GPA: 8.75/10

PREPRINT

- **Natural Answer Generation: From Factoid Answer to Full-length Answer using Grammar Correction**[\[Paper\]](#)
Manas Jain, Sriparna Saha, Pushpak Bhattacharyya, Gladvin Chinnadurai, Manish Kumar Vatsa
Work under review at *18th International Conference on Natural Language Processing (ICON-2021)*

UNDERGRADUATE THESIS

Natural Answer Generation: Factoid to full-length answer generation Aug'20-Aug'21
Guide: *Prof. Pushpak Bhattacharyya (CSE dept)*, collaboration with LG-Soft,India CFILT Lab, IIT Bombay

- Worked on generating **full length answer** based on **factoid** using **pointer generator network** and **attention**
- Developed a Neural **Natural Answering** model by **fine-tuning DialoGPT2** model on 13000 examples
- Proposed a unsupervised **rule based approach** based on syntactic parse tree of question with transformer based **Grammar Error Correction** model as a post processing step

TECHNICAL EXPERIENCES

Data Scientist | Hilabs, Pune Jul '21 - Present
US based healthcare-focused artificial Intelligence solution for reducing financial losses caused by data errors

- Working on Prediction of procedure and diagnosis **medical codes** from clinical notes using **MIMIC-III dataset**
- Pioneered a strategy to **increase** the training size by **context matching** to extract entities from documents
- Improved **OCR** accuracy by implementing **line & text segmentation** algorithm using OpenCV and Tesseract

Research and Development AI Intern | Daikin Industries, Japan Summer '20
Worked under the theme of Advanced Digital Engineering Technique utilizing AI technology in the team DigiNavi, ICT group at Technology and Innovation Centre, Osaka

- Worked on **NLP** based **video tagging, captioning and summarizing** using audio data on AC servicing videos
- Implemented a robust **TF-IDF** and **vocabulary based entity count** algorithm to extract **tags** from a video
- Developed **video captioning & extractive summarization** model using state of the art **BERT** language model
- Applied **unsupervised techniques** like **LDA Topic Modelling & S-BERT** for sentence **clustering** in transcripts
- Implemented the **end to end pipeline** using **GCP speech to text API** to get transcripts from video data

Data Science Research Intern | Prodigious Technologies (Y-Combinator backed) Summer'20
Developed a sentiment scoring model on collection call conversation having agent and borrower transcripts

- Worked on **23000 unstructured call data** to provide **automated analytics**, services to call-centre
- Implemented state of the art **unsupervised lexicon** and rule based **sentiment analysis** model **VADER**
- Performed extensive **EDA** and cross validation of scores with pre-existing data available like **call scores (FICO score)**, **Promise to pay** Achieved **0.6 and 0.7** correlation value respectively with sentiment scores
- Created a small dataset having sentiment scores for **100 calls**, obtained **0.52 F1** score on this dataset using **VADER**

AI Programmer | Samespace (Novanet Inc.), Mumbai (Conversational AI startup) Summer'19
Developed Deep Learning models in python using Keras and NLTK, Worked on call data transcripts

- Created a model of **Toxic comment classification** and Profanity Detection trained on **1.6 lakhs** online comments using pre-trained word embeddings of **GloVe** as input of the **Bidirectional-LSTM** which achieved **96%** accuracy
- Pioneered a model of **Sales Call Classifier** to predict the customer on call is interested achieving **92%** accuracy
- Developed a **Sentiment Analysis** model trained on **16 million** data of Amazon reviews and twitter dataset
- Implemented a **Named Entity Recognition** model augmenting the existing dataset with Indian names & places

Driverless Car | Team SeDriCa, Innovation Cell, IIT Bombay

Oct'18 - Sept'19

Currently one of the **11 finalists** among 259 teams of the **Mahindra RISE** Driverless Car Challenge

- Part of a team of 20 students of various departments to develop a **self driving** car, which is a **fully autonomous** car customized for the **Indian road conditions** that obeys the Indian traffic rules
- Implemented a **Bidirectional RRT Star** algorithm for **path planning** between two points in a **2D-Grid** having multiple obstacles of random shape using the concept of **Costmap** in **ROS C++**
- Studied Papers on **RRT Star Smart** which gives the shortest path with less time complexity

Software Developer | Carcrew Technology Pvt. Ltd, Mumbai

Dec '18

- Developed a login page for mobile app in **React-Native** and a **React-Admin** web application to facilitate a clean, workable interface for executing the CRUD utilities on the database
- Learnt and explored python framework **Flask** for building **Restful API** for the application

KEY TECHNICAL PROJECTS

Multilingual Relation Classification [\[Code\]](#)

Spring '21

Guide: Prof. Soumen Chakrabarti | R & D project

Info Lab, IIT Bombay

- Fine-tuned **MuRIL** model on custom made english RE dataset having 35 labels; 16784 in train set and 175 in test
- Achieved an accuracy of **91.43%** & **86.29%** when fine-tuned **BERT** & **RoBERTa** models respectively

Speech-Driven Facial Animation using Temporal GANs [\[Slides\]](#)

Spring '21

Guide: Prof. Preethi Jyothi | Course Project (CS 753 - Automatic Speech Recognition)

IIT Bombay

- Modified **ImaGINator** generator to take speech signal as input to create a continuous frame of images as a video
- Implemented 3 Discriminator and achieved **23.16** average PSNR value after few epochs of training on **GRID** dataset

Hyperparameter Optimization of Machine Learning Algorithms [\[Slides\]](#) [\[Report\]](#)

Spring '21

Guide: Prof. Ganesh Ramakrishnan | Course Project (CS 769 - Optimization in Machine Learning)

IIT Bombay

- Studied Grid search, random search, hyperband, Bayesian Optimization, genetic algorithms to perform HPO
- Experimented the above HPO algorithms for regression, classification task on 4 ML models - RF, SVM, KNN, ANN

Music Genre Classification using ML and DL techniques [\[Slides\]](#) [\[Code\]](#)

Spring '21

Guide: Prof. Biplab Banerjee | Course Project (DS 303 - Introduction to Machine Learning)

IIT Bombay

- Trained KNN, SVM and FFNN on GTZAN dataset having 58 features; achieved 89% accuracy using FFNN
- Implemented a CNN architecture and trained it on Mel-Spectrograms extracted from raw audio using Librosa

Neural cross-lingual Summarization: English Paragraph to Hindi Summary [\[Slides\]](#) [\[Code\]](#)

Fall '20

Guide: Prof. Pushpak Bhattacharyya | Course project (CS 626 - NLP, Speech and Web)

IIT Bombay

- Created a dataset having **90000** training data using **google translate API** from Daily News summarization dataset
- Implemented **Multi task transformer** architecture based approach having 1 encoder and 2 decoders for the task of Machine Translation and cross-lingual summarization jointly trained on HindiEnCorp MT dataset and CLS dataset

Sentiment Analysis with Deep Learning using BERT (Self Project)

June '20

- **Fine-tuned** the **BERT** language model for **emotion classification** task using hugging face **transformer**
- Used **PyTorch** for training the last layer on **SMILE twitter** dataset using cross entropy loss on google GPU
- Achieved an accuracy of **95%** on the 'happy' emotion class having maximum data in training

Semantic nuclei Segmentation

Spring '20

Guide: Prof. Suyash Awate | Course project (CS 736 - Medical Image Computing)

IIT Bombay

- Implemented the state of the art image segmentation **U-Net** architecture with Batch Normalization layers in PyTorch
- Trained the model on **670** images using data augmentation which achieved max IoU of **0.72** on validation set

Generative Adversarial Approach for text based Zero-Shot Learning

Autumn '19

Guide: Prof. Biplab Banerjee | Course project (GMR 638 - Machine Learning II)

IIT Bombay

- Implemented the **CVPR'18** paper titled 'Generative Adversarial Approach for Zero-Shot Learning from Noisy Texts'
- Given the text descriptions of a type of bird species, we have to recognize the novel classes of birds with no examples
- Formulated ZSL problem as a **supervised classification problem** by training the **Generator** to produce synthetic visual features given an input semantic embedding extracted from text which achieved **43%** accuracy on CUB dataset

Face Recognition using Siamese network

Autumn '19

Guide: Prof. J. Indu | Course project (CE 712 - Digital Image Processing)

IIT Bombay

- Pioneered a model to identify faculty name in a image using **few shot learning** having just **2-3** images per faculty
- Used pre-trained **Facenet** named siamese neural network architecture to extract image feature vector and embeddings

Automization of Parallel Pipe Flow

Guide: Prof. Riddhi Singh | Course project (CE 228 - Applied Hydraulics Engineering)

Spring '19
IIT Bombay

- Designed a **optimized algorithm** to determine the distribution of flow across the parallel pipes for a given total discharge and dimensions of pipe in **C++** programming language using **cmath** library
- Used **recursion** to calculate friction factor by equating the head loss value in every pipe through **iterations**

FAQ Chatbot for Freshmen

Seasons of Code, Web and Coding Club

Summer '18
IIT Bombay

- Wrote a code for a python dictionary with key as the question and their value as the answer (**intent-entity** matching)
- Explored **web scraping** to train our bot on different **QnA** present on **FAQ page** of different department websites

Killer Sudoku

Guide: Prof. Krishna S. | Course project (CS 101)

Spring '18
IIT Bombay

- Designed a optimal solution of a **9X9** killer Sudoku from scratch in **C++ programming language**
- Implemented the code using **structures** for taking input as a multi-dimensional array and used **backtracking recursion algorithm** to solve the Sudoku and also analyzed **space and time complexity**

TECHNICAL SKILLS

Programming	C++, Python, Scala, Julia, MATLAB, R, Git
Tools/Framework	Tensorflow, PyTorch, Keras, Spark, Hadoop, MySQL, OpenCV, librosa, scikit-learn, Flask
Web Development	React-Admin, React-Native, HTML/CSS, Bootstrap

KEY COURSES UNDERTAKEN

Artificial Intelligence	Automatic Speech Recognition; Optimization in Machine Learning; Advance Machine Learning; Speech, NLP & Web; Machine Learning of Remotely Sensed Data II; Medical Image Computing; Introduction to Machine Learning; Digital Image Processing of Remotely Sensed Data
Computer Science	Operating Systems; Data Structures & Algorithms; Computer Networks; Computer & Network Security; Computer Programming in C++
Mathematics	Probabilistic & Statistical Methods; Linear Algebra; Calculus; Differential Equations

SCHOLASTIC ACHIEVEMENTS

- Secured **AIR 2096** out of the 0.22 million candidates who appeared for **JEE Advanced** in 2017
- Secured 99.37 percentile among 1.3 Million candidates who appeared for JEE Mains exam in 2017
- Recipient of the prestigious **KVPY Fellowship** with an **AIR 1110** among **136,804** candidates in 2017
- Awarded certificate of merit for being placed in **Top 1%** in Rajasthan out of **6575** candidates in NSEC 2016-17

TEACHING, MENTORING AND LEADERSHIP ROLES

Teaching Assistant | MA 106, Linear Algebra

Mathematics Department

Mar 2021 - May 2021
IIT Bombay

- Organized weekly tutorial (problem solving) sessions for a batch of 50 students
- Involved in setting and evaluating examinations, helped in handling logistics for an online mode of the course

Coordinator, Techfest 2018

Robowars, Events Department

Autumn 2018
IIT Bombay

- Assisted in ideation and on ground execution of Student Solar Ambassador Program, a Guinness World record
- Responsible for conceptualization and management of International Robowars Competition (100+ teams)
- Organised and moderated a Facebook live event (212k views) interacting with international participants

EXTRA-CURRICULARS

Sports

- Represented Udaipur district in **Rajasthan State Level Table Tennis** competitions
- Lead the team Winning the **Gold** medal in the Institute Table Tennis League (ITTL) among the 7 teams participating

Entrepreneurship

- Mentored** 3 freshmen teams, guided them in creating a **BMC**, **pitch deck** and preparing a pitch among which 1 team was ranked **1st** in the EnB Buzz competition among 100+ teams
- Authored an article titled '**Cryptocurrency: The future of money**' published in **EnSpace'18** (Ecell newsletter)