

# HIMANSHU

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## EDUCATION

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**Indian Institute of Technology, Kharagpur**

MSc in Mathematics and Computing

**Current CGPA: 8.53/10**

July 2016 - ongoing

**Central Academy, Kota, Rajasthan**

Higher Secondary Certificate Examination (CBSE)

**Aggregate 92%**

April 2015

**Ramakrishna Mission Vidyapith, Deoghar, Jharkhand**

Secondary School Certificate Examination (CBSE)

**Aggregate 10/10**

March 2013

## RESEARCH INTERESTS

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Image Classification using Deep Convolutional Networks | Text Classification and generation using CNN and RNN | Machine learning algorithms | Inverse problems in signal and image processing | Sparse modeling of signals and their deployment in signal processing

## RESEARCH PUBLICATION

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Sreeja. S. R, **Himanshu**, Debasis Samanta “Weighted sparse representation for classification of motor imagery EEG signals,” in *International conference*, 2018/12 (in process).

## WORK EXPERIENCE

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**GreyAtom EduTech Pvt Ltd**

**Position:-** Data Science Winter Fellow

**Mumbai, India**

December 2018

- Created content on Language model which included: N-grams, Noisy Channel Model, evaluation of language models i.e. perplexity, Spell check, Smoothing with Laplace, Add-K and Backoff and Interpolation methods.
- Worked on assignments and contents of Convolutional Neural networks course. Visualization of CNN. Discussions on classical networks of AlexNet, VGG16 and advanced networks, ResNets and Inception Networks.
- Worked on Convex Optimization: Mathematical optimization, Lagrange Multipliers, Least square problem and linear programming with simplex method and visualization and Lagranges duality.

## RESEARCH EXPERIENCE / PROJECTS

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**Sparse Representation Based Classification of EEG signal**

**Guide:-** Prof. Debasis Samanta Dept. of Computer Science Engineering

**IIT Kharagpur**

Dec 2017 - present

- Construction of Dissimilarity-Weighted Sparse Representation for multi-class classification of motor imagery EEG signals using its wavelet and bandpower features and a weighted Dictionary.
- Implementation in python and experiment with various Dissimilarity measures and number of sparse coefficients to determine best possible combination for speed and accuracy of classification.
- Dictionary size reduction by reducing the number of atoms in the dictionary by redundancy removal and by learning new dictionary using label consistent ksvd and discriminant ksvd.

**Prediction of Accident severity of a region**

**Course:** Soft Computing tools in Engineering **Guide:-** Prof. S K Barai

**IIT Kharagpur**

March 2018

- Made a prediction model in keras with resampled data using SMOTE and with features like road conditions, weather and lightning conditions, time, day of week and few other factors.
- Made a Flask app, which marks regions of a city based on accident severity on three levels as low, high and very high integrated with the trained prediction model in real time.

## PROJECTS

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### Assignments during Deep Learning Course

IIT Kharagpur

**Guide:-** Prof. Sudeshna Sarkar, Dept. of Computer Science Engineering

January 2019 - April 2019

- Text classification using CNN on skewed dataset comprising of tweets pertaining to common causes of cancer with the objective to classify the tweets as medically relevant or not. Used fasttext on corpus to get embeddings and resampling to remove skewness. *link to codes*
- RNN for language modelling and use the trained model for the following tasks: 1. Predicting the last word of a sentence 2. Generating a sequence of words. Experiment with one-hot encodings and pre-trained embeddings and using SGD optimizer and softmax for classification.

### Kharagpur Data Analytics Group

IIT Kharagpur

**Guide:-** Prof. Debodoot Sheet, Dept. of Electrical Engineering

July 2017 - Present

- Tensorflow implementation of ten way classification of images in CIFAR10 dataset using deep convolutional network along with pooling and regularization with relu activation function.  
*Github link to the repository containing related codes*
- Implemented deep neural network for handwritten digit classification and analysis of titanic dataset using decision trees and linear SVM.

### Kaggle and other competitions

IIT Kharagpur

**Codes:-** Github Link

July 2017 - Present

- Dog Breed classification using transfer learning with VGG19. Using a dense layer and softmax with pre-trained model for classification.
- Contextual Emotion Detection in Text for Emocontext online competition by Microsoft. Used attention mechanism for classification using pre-trained embedding and bidirectional LSTM with softmax for classification.

## TERM PAPERS

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### ImageNet Classification with Deep Convolutional Neural Networks.

IIT Kharagpur

**Course:** Soft Computing tools in Engineering **Guide:-** Prof. S K Barai

February 2018

### Fuzzy Logic in Content Based Image Retrieval using Color Feature.

IIT Kharagpur

**Course:** Soft Computing tools in Engineering **Guide:-** Prof. S K Barai

April 2018

## COURSEWORK

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**University Courses :** Design and Analysis of Algorithms | Soft Computing tools in Engineering | Programming and Data Structure | Probability and Statistics | Numerical solution of ordinary and pde | Computer Organisation and Architecture | Object Oriented System Design | Machine Learning | Deep Learning\*\* | Measure theory and Integration\*\* | Basic Electronics | Transform Calculus | Partial Differential Equations | Linear Algebra | Real Analysis | Numerical Methods | Modern Algebra\*\* | Operation Research\*\*

\*\* denotes ongoing courses

## TECHNICAL SKILLS

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### Programming Languages

Python, R, C++, Java

### Specialized Libraries Environments

Tensorflow, Keras, Scikit-learn, Git, OpenCV, Matplotlib

### Other tools

Adobe Photoshop, Lightroom, Visual Studio, Linux

## OTHER ACHIEVEMENTS

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- Made a web app g-attach for organizing email attachments separately in Microsoft Code.fun.do competition held at IIT Kharagpur.
- Added features and tests in sunpy an open source repository in Github in python.
- Implemented strategies in C++ for bots to play football in code-o-soccer held in Kshitij IIT Kharagpur.