

PAVAN RAJKUMAR MAGESH

Personal Website

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EDUCATION

Visvesvaraya Technological University

CGPA - 8.80

Bachelor of Engineering in Computer Science

2017 - 2021 (Expected)

Narayana Educational Institutions

Grade 12 - 89.5% (Focus in science and computers - Karnataka State Board)

High School

Grade 10 - 10.0 CGPA (Central Board of Secondary Education, India)

2013 - 2017

PROFESSIONAL EXPERIENCE

Eurofins Scientific - Developer Intern

July 2020 - November 2020

Developed an application that estimates the bug inducing risk of 'git commits' using machine learning. Was tasked with model building and explainability. Project led to the minimization of time spent on code reviews. Commit data was tested on various ML models and utilised model interpretability techniques to tune and improve performance. Wrote two research papers on the same.

RESEARCH WORK

• An Explainable Machine Learning Model for Early Detection of Parkinson's Disease using LIME on DaTscan Imagery

Pavan Magesh, Richard Delwin, Rijo Jackson (Nov 2020) *Computers in Biology and Medicine* (Vol. 126), Elsevier

Developed a neural network model using transfer learning to diagnose Parkinson's Disease by analysing the varying sizes of the putamen and caudate regions of the brain as visualised in SPECT DaTscans. Explained the predictions obtained using superpixels generated by LIME methods. [Paper Link](#)

• Software Risk Prediction using Supervised Machine Learning Techniques

- Predicting the risk and impact of newly introduced code into a project code base. Used supervised machine learning to classify new git commits as bug inducing or not. Compared performance on neural networks, naive-bayes, SVMs, random forests, and logistic regression. (Paper under review) [Paper Link](#)

• An Explainable Machine Learning Model for Early Detection of Parkinson's Disease using LIME on Speech Signals

- Developed SVM, random forest and neural network models to diagnose Parkinson's Disease by analysing the variations in the speech samples of patients. Further utilised the LIME framework to explain the classifications obtained. (Research Ongoing) [Draft Link](#)

• Choosing the Best Set of Features for a ML Model for Software Risk Prediction

- Identified which features of a commit (like lines added, deleted etc.) has the most impact on determining a commit's bug risk. Utilised SHAP explanations to determine these characteristic features which allowed us to increase their weightage and improve performance of a commit risk classifier. (Papers under review) [Paper Link](#)

• A Comparative Study of Transfer Learning Models for Medical Imaging

- Transfer Learning is often used to speed up the training process of ML models by using existing weights and architectures as a basis step. This study compares the transfer learning performance on popular CNNs - AlexNet, VGG16, LeNet, InceptionV3, and ResNet. The aim is to improve methods for rapid prototyping of medical imaging systems. (Research Ongoing)

• Bachelor's Thesis Project

- Aim to implement our existing research into clinical practice by developing a desktop tool which can be used by medical practitioners to diagnose Parkinson's Disease using various health bio-markers like speech, brain-scans, handwriting etc. Project in collaboration with National Institute of Mental Health Sciences, Bangalore.

TECHNICAL SKILLS

- Programming Languages - Python, Java, MATLAB, SQL, Bash scripting, LaTeX, and Git version control.
- Machine learning algorithms using relevant python packages and frameworks for analysis and modelling.
- Experience in building predictive models across healthcare data involving digital image and signal processing.
- Research skills such as formulating, designing, conducting, and writing conclusive studies.

RELEVANT COURSEWORK

- Machine Learning
- Operations Research
- Engineering Mathematics
- Software Engineering
- Data Structures and Algorithms
- Python Application Programming

CERTIFICATIONS

(Links to certificates can be found Personal Website link above)

- AI for Medicine Specialization (3 courses)- Coursera
- Computational Neuroscience - Coursera
- Deep Learning Specialization (5 courses) - Coursera
- Fundamental Neuroscience for Neuroimaging - Coursera
- Principles of fMRI 1 & 2 - Coursera
- Digital Signal Processing 1 & 2 - Coursera
- Machine Learning - Coursera

POSITIONS OF RESPONSIBILITY

- **Founder and Head of the Student Research Cell** - Responsible for introducing research to students by conducting workshops and seminars. Am also responsible for connecting students with potential faculty guides with similar research interests.
- **Student Coordinator at Google Developers Student Club** - Was responsible for conducting requirement analysis and building mobile solutions for local businesses in and around college.
- **Core organizer for Google's Student Mobile Developer Fest** - Held at our university and attended by over 500 participants.

PROJECTS

- **Brain Tumour Auto-segmentation** - Developed a deep neural network to segment brain tumours from a given MRI scan using the U-net architecture. Used various computer vision python libraries like OpenCV and Pillow.
- **Medical Prognosis Models** - Worked on building prognostic models to predict future patient risks. Built a risk score model for diabetic retinopathy in diabetic patients using logistic regression.
- **Computational Neuroscience Mini-Projects** - Developed a series of mini-projects in accordance with the computational neuroscience course from Coursera. Wrote code involving neural modelling and neuron simulations.
- **Chest Disease Classification** - Made a neural network model to classify 14 classes of chest diseases by analysing Chest X-Ray scans from patients. Accompanied the study by reading state of the art papers like 'CheXNet' from the Stanford ML Group.
- **fMRI Analysis** - Worked with real fMRI data to understand how to handle them in digital format, enhance and reconstruct them, observe relationships amongst voxels, develop correlation maps and linear modelling.
- **Machine Learning Mini-Projects** - Developed and implemented various machine learning algorithms on corresponding datasets as part of the online courses I have taken. Carried out data preprocessing and analysis on database sets. Some of the algorithms include - Regression, Decision Trees, Bayesian Methods, Clustering techniques, Dimensionality Reduction, and ANNs.
- **University Result Management System** - Developed a result management system for the analysis of student performance in their internal and external exams. Developed using technologies like PHP, MySQL and web design languages.
- **VTU Results Scraper** - Developed a program to web scrap all semester results of university students using pure shell. Achieved roughly 4x faster performance than Python's BeautifulSoup and is currently in use in the Computer Science Department.