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Education

- **Indian Institute of Technology** — Jodhpur, India
  Ph.D. — *2022 -*
- **Indian Institute of Technology** — Jodhpur, India
  M.Tech AI; 8.6 current CGPA — *2020 - 2022*
- **Delhi University** — Delhi, India
  MSc Computer Science; 79.35% — *2017 - 2019*
- **Delhi University** — Delhi, India
  BSc Computer Science; 88.71% — *2014 - 2017*
- **PDDSVM, CBSE** — Vrindavan, India
  12th: 90.4%, 10th: 9.4 CGPA — *2009-2013*

Other Academic Achievements

- **UGC NET-JRF**: Rank-17, 99.9 Percentile,
- **Research Week Google**: Selected for attending the Research Week with Google in Computer Vision track(2022),
- **CVPR 2022 Registration Waiver**: Review committee awarded Registration waiver for attending CVPR 2022,
- **Google India Challenge Scholarship**: Selected for the Google India challenge scholarship in the web development track,
- **GATE**: 2020 Qualified (Rank- 605)

Relevant Academic Projects

M.Tech Project Part 1 [report]:
Guide, Dr. Anand Mishra, CSE Dep. IIT Jodhpur

- This project addressed the task of visual relationship grounding in videos using a meta-learning-based few-shot learning approach.
- The challenges of Video Visual Relationship datasets, such as limited availability, expensive annotation, and predicates having a long tail distribution, are addressed using the proposed task viz. Few-Shot Visual Relationship Grounding (FSVRG) in videos.
- The grounding of the visual relationship posed as an optimization-based labeling problem on a fully connected graph among a few videos.
- The cost of labeling is obtained using a few-shot trained relation network.

Fast Incremental SVDD with the Gaussian Kernel Algorithm [paper][code][report]:
Course Project, Dr. Deepak Mishra, CSE Dep. IIT Jodhpur

- The proposed method in paper is implemented and improved for outlier detection.
- The improvement is made by selecting a point as a support vector based on its dynamic distance from the decision boundary.
- The dynamic distance is calculated by penalizing the distance with the number of iterations in the algorithm. In this way, redundant support vectors are removed from the decision boundary.
- This helps in better F1 score with fewer support vectors which helps in better generalization of the algorithm.

CVPR Plant Pathology Challenge [poster][report][code]:
Course Project, Prof. Mayank Vatsa, CSE IIT Jodhpur

- It is a fine-grain leaf disease classification Kaggle challenge (FGVC8 CVPR workshop).
- This project aims to address the challenges of depth perception, angle, light, shade, and leaf age.
- This project is implemented using non-deep learning techniques (SVM, Naive Bayes, Logistic Regression) and deep learning techniques (VGG16, ResNet18 and 50, EfficentNetB4 and B7.

Graph Convolutional Networks [report] [code] [ppt]:
Course Project, Dr. Anand Mishra, CSE Dep. IIT Jodhpur

- This project explores Graph Convolutional Networks (GCNs) for different problem setups and dataset modalities (graphical, text, images).
- This project implements the existing methods of GCN with several datasets with the same protocols as discussed in the papers.
- Some changes are carried to the proposed approaches of GCN to improve the final results, such as ReLU activation, Dropouts, and Adam optimizer.

Analyzing and Assessing Biases in Classification Machine Learning Models [report] [code]:
Course Project, Prof Richa Singh, CSE Dep. IIT Jodhpur

- In this project, bias is detected in the classification models using metrics such as Disparate Impact, Statistical Parity, Consistency, and Equality of odds for different datasets.
- Detected biases are mitigated using Pre-processing, In-Processing, and Post-Processing algorithms.
- Finally, the effect of each bias-mitigation algorithm on model performance is studied.

Regularizing Neural Networks via Adversarial Model Perturbation [paper] [code] [report]:
Course Project, Prof. Mayank Vatsa, CSE Dep. IIT Jodhpur

- In this project proposed approach of Regularization Neural is implemented using the same protocol as described in the paper on given datasets.
- Further, a new dataset is used for experiments to verify and mimic the author's experiments.

Neural Machine Translation [report] [code] [papers]:
Course Project, Dr. Lipika Dey, CSE Dep. IIT Jodhpur

- In this project, three papers from the ACL Conference on Neural Machine Translation (NMT) are reviewed and summarized.
- Further, NMT is implemented on the English to Marathi dataset using BiLSTM as an encoder and decoder with an attention mechanism.

Grid World Game using Reinforcement Learning [code] [report]:
Course Project, Dr. Debarati Bhunia Chakraborty, CSE Dep. IIT Jodhpur

- This project is implemented using a Q learning algorithm for finding a path to a random goal in an adversarial grid world environment.

Image Segmentation [code] [report]:
(Course Project, IIT Jodhpur)

- In this project, UNet and FCN32 model architecture are implemented from scratch using PyTorch library for Cityscape and Nail segmentation dataset.

Blind Watermark Creation and Detection [code] [report]:
(Course Project, IIT Jodhpur)

- This project is implemented Using Discrete Wavelet Transform for creating and detecting blind watermarks on images.

MSc Thesis
Text Summarization, Mentor: Prof. Vasudha Bhatnagar, Delhi University

- **Textual Entailment Based**: Implement and experiment with an existing algorithm based on Textual Entailment. Based on the results of the experiments create a new algorithm that uses graph properties to rank the sentences in the document which performs better for some of the ROUGE metrics.
- **Graph Based**: Implement and experiment with two well-known Text Summarization algorithms TextRank and Corank that are based on the PageRank algorithm. We combine the TexRank and CoRank and evaluate the performance for the different contributions(linear addition of these two algorithms) to the new algorithm.
- **LSA based**: Implement and experiment Latent Semantic Analysis based Text Summarization algorithms and study the effect of stop words as a preprocessing phase. Optimizes the algorithm by adding a step to check redundancy.
- **Frequency based**: Implement an algorithm that uses word frequency to rank the sentences of a text document. Evaluate its performance and compare it with our other implemented algorithms that show word frequency is a good criterion to rank the sentence and can be included in other algorithms.

Technical Skills

- **Programming Languages**: C, C++, R, Python, HTML & CSS
- **Libraries**: PyTorch, TensorFlow, OpenCV, Pandas, Numpy, Scikit-learn
- **Tools and Software**: Jupyter/IPython Notebook, Git Version Control, Latex

Relevant Courses

- **Mathematics**: Linear Algebra, Statistical Techniques, Optimization, Discrete Structures, Calculus and Geometry, Differential Equations, Operational Research, Graph Theory
- **AI**: AI, Reinforcement Learning, Data Mining, Machine Learning, Deep Learning, Computer Vision, Biological Computer Vision, NLP, Dependable AI
- **Computer Science**: Data Structures and Algorithm, Operating System, Database System, Computer Networks, Computer Architecture, TOC, Digital Electronics, Compiler Design, Design and Analysis of Algorithms

Certifications

- Fundamentals of Accelerated Computing with CUDA C/C++,
- Python3, C++, R

Other Relevant Activities

- Participated and was a rapporteur for the**"International Colloquium on Ethics and Governance of Autonomous AI Systems for a Better World"**, held on February 18 & 19 , 2019 organized by Center for Media Studies and supported by Department of Science & Technology, GOI.
- **Teaching Assistant:** Machine Learning (Winter 2022) at IIT Jodhpur, Created and evaluated quizzes and assignments. Took a session on PyTorch for 200 students.