Binoy Saha

Indian Institute of Technology Madras

Binoy Saha | binoysaha-98

binoysaha98@gmail.com

Education

Program	Institution	%/CGPA	Year
M.S. (Computer Science and Engg)	Indian Institute of Technology, Madras	9.19	2022
B.E. (Computer Engineering)	V.E.S.I.T. Mumbai University	8.77	2019
XIIth Std. - (Maharashtra State Board)	R.K.T. College, Mumbai	79.69	2015
Xth Std. - (Maharashtra State Board)	S.I.C.E.S. High School, Mumbai	87.09	2013

Publication(s)

- **"Stutter Diagnosis and Therapy System based on Speech Processing and Deep Learning"**, Gresha Bhatia*, **Binoy Saha**, Mansi Khamkar, Ashish Chandwani, Reshma Khot; In 13th INDIACom-2019, 6th International Conference on Computing for Sustainable Global Development. [* - Mentor]
  - Attempted to detect and classify stutters in the input audio while existing works focused only on detection of stutters. Trained a Gated Recurrent CNN on MFCC audio features for stutter detection and classification.
  - Proposed an SVM-based system that can suggest therapies based on the type and severity of the stuttering.
  - Developed an Android app, Node.js based server and exploited Firebase for storing API requests and responses.

Key Projects

Detecting places of hideout (conference paper under review in ICVGIP 20-21) **Aug 2020 - Present**

Advisor: Prof. Sukhendu Das *Research Work*

- Proposed two novel feature-level loss functions for self-supervision of the feature extractor to make it invariant to color transformations and equivariant to affine transformations.
- Developed a novel decoder block to extract relevant depth features from only an RGB image as input.

Scene Understanding based on Visual Intelligent System **Aug 2019 - Present**

Advisor: Prof. Sukhendu Das *In collaboration with DRDO, Bangalore*

- Worked on Maximal free-space direction estimation. Floor vs non-floor segmentation map, depth map, and several image processing techniques were used. Lightweight deep learning models were used in order to deploy the entire module on a robot GPU.
- Worked on an ontology-based visual question answering system, where cues from scene graph, depth map, and segmentation map were used to answer a predefined set of questions.

Adjustable Autonomy based on Cognitive Workload **May - Jul 2018**

Advisor: Dr. Sushil Chandra *Internship at INMAS DRDO, Delhi*

- Developed a simulation based on neuropsychological tests with progressively increasing levels of difficulty.
- Recorded EEG signals of several subjects to study how cognitive load affects their performance in the simulation.
- Trained a drone operator model using the toolkit named ml_agents provided by Unity.

Academic Projects

Image Captioning **June 2020**

Deep Learning: Prof. C. Chandra Sekhar *Python, PyTorch*

- Implemented a captioning model with CNN (VGG16) based encoder and single layer unidirectional RNN/LSTM based decoder. NetVLAD was used for feature aggregation.
- Compared performance of RNN based decoder with LSTM based decoder using BLEU score as the evaluation metric.

Machine Translation **July 2020**

Deep Learning: Prof. C. Chandra Sekhar *Python, PyTorch*

- Machine translation [English to Tamil] using LSTM: Single-layer unidirectional LSTM was used as both encoder and decoder. Attention weights were calculated using additive attention mechanism.
- Machine translation using transformer model.

Image Classification **Feb 2020**
Deep Learning: Prof. C. Chandra Sekhar *Python, PyTorch*

- Trained Multi-Layer Feedforward Neural Network (MLFFNN) for classification, with Deep CNN features as input.
- Trained stacked autoencoder and stacked RBM. Then used encoder weights for initializing MLFFNN.

Speaker Verification **Nov 2019**
Pattern Recognition and Machine Learning: Prof. Hema A. Murthy *Python*

- Developed text-independent speaker verification system based on GMMs and FLDA, using NIST SRE'03 M dataset.

Continuous Digit Recognition using Discrete Concatenated HMMs **Oct 2019**
Pattern Recognition and Machine Learning: Prof. Hema A. Murthy *Python, C++*

- Performed isolated digit recognition by training discrete Hidden Markov Models (HMMs) on recorded audio clips.
- Used concatenated HMMs to perform continuous digit recognition.

Course Assignments **Aug 2019 - April 2020**

- Image De-noising using loopy belief propagation, Comparative study between eigenvalue and singular value decomposition, Least square regression, Ridge regression, Bayesian Classifiers, GMM, HMM, DTW.

Professional Experience

Software Engineering Intern: Reis (Startup) **Aug - Nov 2017**

- Developed responsive website for online food ordering having CMS and inventory management system.
- Implemented App shell architecture and lazy loading for performance optimization and performed On-site Search Engine Optimization.

Software Engineering Intern: Accentiv India Pvt. Ltd, Mumbai **Jun - Aug 2017**

- Developed a Hybrid mobile app.
- Developed responsive mobile-first HTML template with specially designed e-commerce pages for close to native mobile experience on a responsive web app.

Relevant Coursework

- **Intelligent Systems**: Pattern Recognition and Machine Learning, Deep Learning, Probabilistic Graphical Models, Computer Vision, Soft Computing, Artificial Intelligence, Operations Research.
- **Math based courses**: Linear Algebra and Random Processes.

Technical Skills

- **Programming Languages**: C, C++, Java, Python, HTML, CSS, Javascript, Jquery, PHP
- **Frameworks**: Pytorch, Tensorflow, OpenCV, Laravel, Codeigniter, Bootstrap, Node.js, Express, Angular
- **Database Management Systems**: MySQL, MongoDB, Firebase, SQLite
- **Tools**: LaTeX, Git, Postman, Unity, Xampp

Positions of Responsibility

- **Project Associate** for a DRDO project **Aug 2019 - Present**
  - Implemented, managed, and co-ordinated the project outcomes along with three other members.
- **Web Developer** at Computer Society of India **Aug 2016 - March 2017**
  - Created the official website for CSI VESIT using Laravel framework.
  - Co-ordinated and executed technical events organized by the council.
  - Conducted workshops on PHP and JavaFX.