Binoy Saha | CS19S024

Indian Institute of Technology Madras

Placement Reg. No.: 55/CS/22/003 | **in** Binoy Saha | binoysaha-98

Education

Program	Institution	%/CGPA	Year
M.S. (Computer Science and Engg)	Indian Institute of Technology, Madras	9.19 Proof	2022
B.E. (Computer Engineering)	V.E.S.I.T. Mumbai University	8.77 Proof	2019
XIIth Std. - (Maharashtra State Board)	R.K.T. College, Mumbai	79.69 Proof	2015
Xth Std. - (Maharashtra State Board)	S.I.C.E.S. High School, Mumbai	87.09 Proof	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] Proof1, Proof2, Proof3, Proof4
  - 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 Proof 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 Proof1, 2, 3 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 Proof 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.

Gloden Hour Response Proof Dec 2017 - Jan 2018

- Developed a website using MEAN stack to help users get medical assistance at the earliest.
- Webview was used to embed the website into an android app.
- The application contained chat module, alert system and many other helpful features.

Smart Mirror Proof Jan - Feb 2018

- Designed a mirror that displayed useful customizable information like weather details, current time, cricket score, quotes to the person standing in front of it.
- The mirror used face recognition for user authentication and made several API calls to fetch data.

Academic Projects

Image Captioning Proof   **June 2020**
CS6910 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 Proof   **July 2020**
CS6910 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 Proof   **Feb 2020**
CS6910 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 Proof   **Nov 2019**
CS5691 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 Proof   **Oct 2019**
CS5691 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**
CS6730 Probabilistic Graphical Models: Asst. Prof. Manikandan Narayan,
CS6350 Computer Vision: Prof Sukhendu Das,
CS5691 Pattern Recognition and Machine Learning: Prof. Hema A. Murthy

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

Professional Experience

Software Engineering Intern: Reis (Startup) Proof1, Proof2   **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 Proof   **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*.
- **Math based courses**: Linear Algebra and Random Processes.
- * - B.E. Courses: Proof, Other (M.S.) Courses: Proof

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 Proof1, Proof2   **Aug 2019 - Present**
    - Implemented, managed, and co-ordinated the project outcomes along with three other members.
- **Web Developer** at Computer Society of India Proof   **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.

Awards and Achievements

- **Ranked 1st** in college in **HSC** exam conducted by Maharashtra State Board. Proof
- **Ranked 1st** in coaching centre in GATE exam. Proof
- Secured **All India Rank 1092** in GATE CS 2019. Proof