Vishal Agarwal

B.Tech, Electronics and Electrical Engineering
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Education

- **Indian Institute of Technology Guwahati** — Guwahati, India
  B.Tech in Electronics and Electrical Engineering with minor in Computer Science — *2015 – 2019*
  GPA : 8.78/10 ***(Departmental Rank : 2)***

Publication

- **An Interval Type-2 Fuzzy Approach to Automatic PDF Generation for Histogram Specification**
  arXiv : 1805.02173 : Vishal Agarwal, Diwanshu Jain, Vamshi K. Reddy, Frank C.H. Rhee
- **Discovery of Splice Patterns through Visualization of Recurrent Networks** — Ongoing
  To be submitted in Bioinformatics

Experience

- **Nvidia Graphics** — Bangalore, India
  GPU Architechture Intern — *May 2018 – July 2018*
  - Worked with **GPU Performance Verification Team** on improving latency and performance analysis in a performance simulation environment for GPUs.
- **Hanyang University, Computational Vision and Fuzzy System Lab** — Ansan, South Korea
  Research Intern — *May 2017 – July 2017*
  - Worked on image contrast enhancement using modified histogram specification to generate an appropriate probability density function (PDF) based on the histogram of input image.
  - Implemented the transformation using fuzzy type-I and type-II modelling and proposed 4 methods for generating the PDF based on type reduction.
  - Used Average Information Content (AIC) metric for comparing our proposed method with existing well known methods such as BBHE, RMSHE and BPFHE.

Projects

- **Representational Learning Model for Learning Splicing Signals** — Ongoing
  Prof. Ashish Anand, Dept. of CS, IIT Guwahati
  - Splicing is a highly regulated process in gene expression which leads to protein diversity and hence understanding its drives are important to understand human genome.
  - Implementing sequence-to-sequence models to learn important features or motifs of DNA sequences in both supervised and unsupervised setting and predict competitive nature of splicing.
  - Extending our analysis by proposing few visualization techniques to identify motifs or parts of sequences which induce competitive effect in splice sites and influence splicing.
- **Deep Face Quality Assessment** — Ongoing
  Prof. Kannan Karthik, Dept. of EEE, IIT Guwahati
  - Working on Full Reference based Face Image Quality Assessment to evaluate a facial image for its utility in facial recognition systems.
  - This can act as a pre-processing state for any critical facial recognition system which rejects face images below a certain threshold.
  - Using convolutional neural network to build an end-to-end model to predict a quality check score between 0 and 1, given an image.

- **Filter Bank Generation using Incremental Spherical K-Means Clustering** [report]
  - Explored various clustering algorithms and features or filter extraction techniques.
  - Designed an incremental spherical k-means clustering algorithm for clustering large datasets and extract meaningful filters from the clusters to form a filter bank which can be used in various computer vision and image processing tasks.

- **Deep Learning Approach to Bone Age Estimation** [report]
  - Implemented an end-to-end model for estimation of bone age using x-ray images of hand.
  - Used transfer learning in the Inception V3 architechture with a custom trainable regression layer for the output.

Programming Skills

- **Languages**: Python, C, C++, MATLAB, Bash
- **Packages**: Keras, Tensorflow, PyTorch, LaTeX

Key Courses

- **Course Curriculum**
  - Pattern Recognition and Machine Learning
  - Probability and Random Process
  - Image Processing
  - Digital Signal Processing
  - Queueing Systems
  - Biometrics
  - Data Structures and Algorithms
  - Computer Architecture and Embedded Systems
  - Operating Systems
  - Linear Algebra
- **MOOCs**
  - Machine Learning (Andrew Ng, Coursera)
  - CS231n (Andrej Karpathy, Stanford)
  - Deep Learning Specialization (deeplearning.ai)
  - Introduction to RL (David Silver, DeepMind)

Achievements

- **Departmental Rank 2** for the discipline of Electronics and Electrical Engineering.
- Awarded **full scholarship** to attend 2018 Deep Learning Summer School at **Tsinghua University, China**.
- Awarded the **Indian Academy of Science Summer Research Fellowship** for the year 2018.
- Awarded **Change of Discipline** after completion of 1st year on merit basis.

Extracurriculars

- **Mentor** for the 2017 and 2018 freshers under Peer Mentorship Program, IIT Guwahati.
- More than **40 hours of community service** under National Service Scheme, IIT Guwahati.
- **Class Representative**, Department of EEE, IIT Guwahati.
- **Project Manager**, Core Team Member of **Robotics Club**, IIT Guwahati.