Vedant Joshi

Email : vedrocks15@gmail.com
Linkedin: https://www.linkedin.com/in/vedant-joshi-b822bb169/
Mobile : +91-8879891562
Personal Website: https://vedrocks15.github.io/

Education

- **Indian Institute of Information Technology** — Kottayam, India
  B.tech Honours in Computer Science; GPA: 3.94 (9.82/10.0 - Gold Medalist) — *Aug 2017 - May 2021*
- **Thakur Vidya Mandir High School** — Mumbai, India
  Class XII 90.7% — *Aug 2016 - May 2017*
- **Gundecha Education Academy** — Mumbai, India
  Class X 91.3% — *Aug 2014 - May 2015*

Skills Summary

- **Languages**: Python, Java, C, C++
- **Tools**: Tensorflow, PyTorch, OpenCV, SciKit, Nvidia TensorRT
- **Cloud Technologies**: AWS, Microsoft Azure congnitive services

Experience

- **Tonbo Imaging** — Bangalore, India
  Vision & Imaging Engineer - I — *February 2023 - Current*
  - **Lightweight Multiscale Object Detection**: Worked on building improving the novel model, YOLO FIRI, for tiny objection detection by extending the thickness of lower level CSP layers, SK attention module & addition of scales for final prediction. The goal for the model was to promote weak features in high resolution maps along with a dynamic receptive field.
  - **Artificial Data Synthesis**: Worked on re-purposing the attention based UNET models from the diffusion pipelines along with sub-pixel convolutions to build robust models that map the domain of images from one field to other.
- **Vedantu Innovations** — Bangalore, India
  Data Scientist - I — *July 2021 - December 2022*
  - **Cluster Cleaner**: Developed a NLP based cleaning pipeline using a parametric, ensemble mechanism of n-gram SimHashing & Levenstein distances, whose goal was to robustly remove incorrect strings due to OCR misreads. This improved the homogeneity of doubt clusters thereby improving the quality of matches provided by the overall search engine.
  - **Self Supervised Search Engine**: Developed the image matching module of the doubt search engine using self-supervised frameworks to create a compressed & structured latent space that places similar looking diagrams close by for rapid retrieval by approximate KNNs. SimCLR & BYOL models along with an innovative cross temperature NTXent, hardness aware loss function was implemented. To further improve the match rate, a domain specific augmentation pipeline was modelled based on the possible noises generated by students.
  - **Doubts Clustering Module**: Repurposed the self supervised search engine to develop a clustering pipeline via UMAP & HDBSCAN to help academic experts answer more unique doubts.
  - **Voice Nudges**: Developed a concatenative synthesis engine that autonomously generates audio files (nudges) that captures the name of the student in the voice of the class teacher. These nudges helped in improving student engagement during live sessions.
  - **User Cohort Generation**: Implemented the self supervised framework SCARF for tabular data in order to build user behaviour clusters based on their interaction with the platform. The cohorts generated by the pipeline allowed us to infer the parts of our product that a particular student was not utilising & the actions that could be taken to improve his/her engagement.
  - **Profanity Filtering**: Developed a novel profanity detection module via contrastive learning to train a LSTM module that generated embedding vectors which were invariant to the spectrum of ways in which an abuse can be posted on the chat platform. This methodology freed our implementation from the burden of learning Hinglish & also made it future proof by just maintaining a limited as well as dynamic profane vocabulary.
  - **Year On Year Retention**: Worked on building user engagement metrics that quantified student's attention on our platform & indicated whether the student will be retained for the next academic year or not.
- **TCS Rapid Labs** — Bangalore, India
  Research / Industrial study Intern — *September 2020 - March 2021*
  - **Vision based lip reading**: Replicating as well as fine tuning DeepMind's lipNet architecture in Tensorflow2.0 for the LRW dataset, along with implementation of large scale dataset preprocessing, custom edit distance metrics & CTC loss from scratch to train the encoder-decoder network.
  - **Attention Innovation**: Implemented Bahdanau attention mechanism into the LipNet model which allowed it to dynamically shift its focus on appropriate lip movement video frames to achieve better video to character alignment.

- **Vedantu Innovations** Bangalore, India
  Deep Learning Intern *September 2020 - April 2021*
  - **Image Denoisers**: Developed image de-noising/skewing models using UNET segmentation & variational auto-encoders to create binarised images that improve the text extraction accuracy of Tesseract OCR.
  - **Image 2 Latex Markup**: Porting legacy Tensorflow code to 2.0 for attention based image to latex markup generation models & exploiting the use of tensorflow's data pipelines to reduce ETL time.
  - **Subjects Classifier**: Developed a POS for doubt's subject classification using BERT & bi-directional attention based LSTM using custom text preprocessing pipeline in PyTorch.
  - **Siamese Search Pipeline**: Developed an image search module in a lower dimension space using offline mining triplet loss, MobileNetV1 based siamese network, modified scaled YOLOv4 CPU & HNSWLib
- **UST Global** Trivandrum, India
  Quantum Computing Intern *June 2020 - August 2020*
  - **Artifical face mask synthesis**: Developed classical GANs to generate artificial face mask images for increasing the amount of training data for building resource & data intensive face mask detectors.
  - **Quantum Discriminators**: As a part of POS, Quantum convolutional layers were experimented in discriminator network to make the training objective more challenging for generator networks & reduce the difference of distribution between generated & original images as well as handle the instability in achieving of NASH equilibrium.
- **Larsen & Toubro** Mumbai, India
  Software Development Intern *June 2019 - July 2019*
  - **Robotic process automation**: Used RPA to automate the process of manual data extraction & consolidation of GST 3B forms. The system saved 1500 man hours yearly.
  - **Form Extraction**: Completed a POS as well image pre-processing pipeline that improved the domain specific performance of Microsoft's Form Recognizer OCR service before its implementation.

Publications

- **YZR-net : Self-supervised Hidden representations Invariant to Transformations for profanity detection**: PrePrint ArXiv https://arxiv.org/abs/2211.15532
- **Looking For A Match: Self-supervised Clustering For Automatic Doubt Matching In e-learning Platforms**: PrePrint ArXiv https://arxiv.org/abs/2208.09600
- **FYEO : A Character Level Model For Lip Reading**: IEEE 8th International conference on Smart Computing and Communications (ICSCC 2021) · Sep 6, 2021. https://doi.org/10.1109/ICSCC51209.2021.9528104
- **Quantized Coconut Detection Models with Edge Devices**: Journal of Interconnection Networks [Scopus Indexed Journal] · Nov 2, 2021 https://doi.org/10.1142/S0219265921440102

Academic Projects

- **Coco Layers**: Curation of a novel, small scale, robust & feature rich, annotated coconut images dataset using drones at multiple locations in Kerala. Researched on quantized versions of SSD MobileNetV2, YoloV3 & tensorRT optimized tiny YoloV4 for inference on RaspberryPi 3B+ & Nvidia Jetson Nano (GPU utilized). The fastest tiny YoloV4 model was able to achieve 22 FPS detection rate when tested in real conditions. (Jan '20)
- **IoT Dashboard**: Developed a real time, React based dashboard to display live IoT services data for the terminal manager & handled artificially generated data using MongoDB. Facbook's prophet model was used to adapt to the trend, periodicity & seasonality of artificial service demand data for getting accurate predictions. (Jul '20) **Project Link**
- **Lemon picking drone**: Developed a pixHawk script to control an autonomous drone that identified lemons hanging in 3D space using colour segmentation. Robotic arm was controlled based on computed co-ordinates & distance to target by coordinating between flight controller system & RaspberryPi 3B+. (Dec '19) **Project Link**

Honors and Awards

- Received Gold medal for the highest GPA in graduating class of 2017.
- Received Best Paper award at 8th ICSCC by IEEE 2021 in Intelligent Systems & Analytics track.
- Oracle Certified Java Associate Programmer (scored - 91% in JAVA OCA paper)
- Achieved a top 5 rank at Smart India Hackathon-2020 under Airport Authority Of India.

EXTRA-CURRICULAR

- IELTS : 8.0/9.0 (W :7.0, R : 9.0, S : 8.0, L : 8.5)
- Achieved a score of 316/340 in GRE (Quant : 164, Verbal : 152, AWA : 4.0/6.0)
- Regional level swimmer.
- Achieved laurels for debates & elocution in English & Hindi.