SAI SAMARTH R PHAYE

Machine Learning Research Engineer
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WORK EXPERIENCE

- **Machine Learning Research Engineer, Shopee Singapore**

  ○ Developing and managing NLP models which shape the backbone of the recommendation system at Shopee.
  ○ Using named-entity recognition to develop item-attribute prediction models which are further leveraged to improve the recommendation models.

- **Machine Learning Research Engineer, Panasonic Industrial Devices Singapore, Singapore**
  (Supervisor: Dr. Vasileios Vonikakis and Dr. Aryel Beck, July'19 - June'20)

  ○ Developed AI-powered systems for human-sensing technologies for B2B solutions. Worked on face analytics using classical computer vision/deep learning – predicting human demographics using face images in the wild; deploying on the edge devices without compromising the performance. Focusing on **feature selection and learning, model optimization and deployment**.
  ○ Developed an end-to-end system for unsupervised anomaly detection in the CCTV factory videos to detect abnormalities, such as unauthorized access of machines, machine stopping. Introduced a novel ML algorithm for the use-case which executes in real-time [provisional patent applied].

- **Graduate Researcher, Sound and Music Computing Lab, National University of Singapore** [GitHub]
  (Supervisors: Dr. Emmanouil Benetos and A/Prof. Ye Wang, Aug'18 - June'19)

  ○ Researched on novel deep neural methods for Acoustic Scene Classification and assisted in related projects. Proposed a novel architecture for acoustic data, **published in IEEE ICASSP 2019**.
  ○ Teaching Assistant for the course **CS4347: Sound and Music Computing** at School of Computing, National University of Singapore (II Semester AY 2018-19).

EDUCATION

Qualification	University	Institute	Year	Grade/%
B. Tech.	IIT Ropar	IIT Ropar, India	2014-2018	7.28/10
Intermediate/+2	CBSE	HHEA Raipur, India	2013-2014	91.6/100
Matriculation	CBSE	HHEA Raipur, India	2011-2012	9.6/10

PUBLICATIONS

- **[Journal Article] José Ignacio Orlando, .., Sai Samarth R Phaye, .., Hrvoje Bogunović. REFUGE Challenge: A Unified Framework for Evaluating Automated Methods for Glaucoma Assessment from Fundus Photographs. Accepted in** *Medical Image Analysis, Volume 59, January 2020* [Report] [Paper]

  ○ Proposed a 2-level model in the challenge – first sub-network localizes the optic disc region in the sample fundus image, which is further used by second sub-network for finer segmentation of cup/disc.
  ○ Being **one of the top ten teams**, got invited to participate in the onsite round and orally present our work in Medical Image Computing and Computer Assisted Intervention (MICCAI) 2018, Spain.

- **[Conference] Sai Samarth R Phaye, Emmanouil Benetos and Wang Ye. SubSpectralNet – Using Sub-Spectrogram based Convolutional Neural Networks for Acoustic Scene Classification. Accepted in** 14th *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2019* [arXiv] [GitHub] [PPT]

  ○ Proposed SubSpectralNets – a deep learning architecture for acoustic scene classification, which leverages band-wise temporal information of the input time-frequency representations.
  ○ SubSpectralNet achieves a relative **improvement of +14% accuracy** over the baseline model by Detection and Classification of Acoustic Scenes and Events (DCASE) 2018.

- **[Conference and Workshop] Sai Samarth R Phaye*, Apoorva Sikka*, Abhinav Dhall and Deepti Bathula. Multi-level Dense Capsule Networks. Accepted in** 14th *Asian Conference on Computer Vision (ACCV2018), Perth, Australia*, **2 - 6 December 2018.** [arXiv] [GitHub] **Also accepted in** *Women in Machine Learning (WiML) Workshop, NeurIPS 2019, Vancouver, Canada*, **9 December 2019.**

  ○ Proposed Multi-level DCNets – introduces multiple level of capsules in Capsule Networks (CapsNets, NIPS 2017) and empowers the complete network using DenseNets, CVPR 2017.

- Achieves **state-of-the-art performance on MNIST dataset** with **20-fold reduction of training iterations**; **7-fold decrease in the number of parameters** on the CIFAR-10 dataset over the CapsNets.

- **[Technical Demo] Sai Samarth R Phaye, Love Mehta and Mukesh Saini. The One Man Show. Accepted in** 19th ***IEEE International Symposium on Multimedia (ISM2017), Taiwan*, 11 - 13 December 2017** [Paper]
  - Developed an android application helpful for solo-musicians. Lets you record various single instrument videos in sync and using the proposed algorithm, merge them intelligently to create a final video.
  - Uses a **multi-modal system** (SVMs for audio and MLP for image) along with multimedia processing for **instrument recognition in the videos** (for instrument-based audio enhancements such as reverb).

INTERNSHIPS

- **Undergraduate Research Intern, CorTexT Manager / IFRIS, Paris** [Website]
  (Supervisors: Dr. Marc Barbier and Philippe Breucker, May-July'17)
  - Created a PHP application for CorTexT Manager – helps users to **analyse and manipulate big databases** used in the CorTexT Platform.
  - Modified and developed the application over the depreciated API using Silex, PHP, JS/jQuery and AJAX. Also coded a lock mechanism for databases for multi-user accessibility.

- **Undergraduate Research Intern, Université Marne la Vallée, Paris** [YouTube] [GitHub]
  (Supervisors: Dr. Philippe Gambette and Dr. Jean-Marc Leblanc, May-July'16)
  - Created a **very generic and open source** web-interface/ application which would help to extract big databases (Corpus) into various extract formats (Lexico, TreeCloud, TextObserver, HTML, CSV etc.) and perform visualizations on the same.
  - Incorporated **emoticon detection and text visualization tools**, which can be used for further research.

TECHNICAL SKILLS

- **ML/DL Libraries** - PyTorch, Keras, TensorFlow, scikit-learn, OpenCV, ONNX

- **Programming/Scripting Languages** - Python, JavaScript, JAVA, C, C++, SQL

- **Tools** - Jupyter Notebook, MATLAB, LaTeX

ACHIEVEMENTS

- Secured a rank under **top 0.001 percentile** (out of **1.3 million candidates)** in Joint Entrance Exam (Mains and Advanced combined) – national level university entrance examination in India, 2014.

- Won "**Hack In Punjab**" - **All India Level Hackathon Event**, organised by **Top Careers And You**, Sept'15.
  - Created an Android Application using **Ionic Framework** which would solve problems faced by travellers. The app alarms the user when (s)he is within 2km radius of the destination.

KEY ACADEMIC PROJECTS

- **Memify - Automatic Meme Generation Application** – *Computer Vision, Machine Learning, Image Processing*
  (Guide: Dr. Abhinav Dhall, September - November'17)
  - Created an Android Application which captures a picture and **designs a meme according to the expressions of the person** using facial expression recognition.
  - Used **Local Phase Quantization descriptors** as the features to encode the manually created image-captions-dataset which is present on the server and found the best match using chi-squared matching.

- **Surveillance Video Human Detection** – *Machine Learning*
  (Guide: Dr. Mukesh Saini, Feb'17)
  - Developed an application to identify motion regions of a surveillance video and then detect humans in those motion regions.
  - Incorporated the Gaussian Mixture based adaptive background model and trained a Support Vector Machines on Histogram of Oriented Gradients extracted from human image dataset.

RELEVANT COURSEWORK

- Audio Content Analysis, Computer Vision, Multimedia Systems, Database Systems, Digital Image Processing, Data Structures and Algorithms, Discrete Mathematics, Linear Algebra, Probability Theory, Computer Graphics, Computer Architecture, Programming Paradigms and Pragmatics, Operating Systems

OTHERS

- **When not working**, I am **composing music** and here is my **YouTube Channel**. Ex-member of Guitar Ensemble at National University of Singapore (**GENUS**).

- **Spoken Languages:** Fluent in English, Hindi; Beginner in French.

REFERENCES

- **Dr. Emmanouil Benetos**, Senior Lecturer, School of EECS of Queen Mary University of London, UK
  - Contact: +44 (0) 20 7882 6206, emmanouil.benetos@qmul.ac.uk
- **Dr. Deepti Bathula**, Assistant Professor, Indian Institute of Technology Ropar, India
  - Contact: +91 (0) 95011 96606, bathula@iitrpr.ac.in
- **Dr. Abhinav Dhall**, Lecturer, Human-Centred Artificial Intelligence lab, Monash University, Australia
  - Contact: +61 (0) 403 340 928, abhinav.dhall@monash.edu
- **Dr. Vasileios Vonikakis**, Senior Principal Engineer, Panasonic Industrial Devices Singapore
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