Soundarya Krishnan

soundark@andrew.cmu.edu | +1 878-999-6527 | soundarya98.github.io

Education

Carnegie Mellon University (CMU) | CGPA: 4.0/4.0
M.S. Machine Learning
Pittsburgh, PA | Aug 2021 – Dec 2022
Machine Learning (PhD), Probability and Mathematical Statistics, Advanced Natural Language Processing, Advanced Deep Learning*, Convex Optimization*, Multimodal Machine Learning* (* indicates in progress)

BITS Pilani Goa Campus | CGPA: 9.51/10
B.E. Computer Science, M.Sc. Physics
Goa, India | Aug 2016 – Jun 2021
Department Rank 1, Awarded the Institute Merit Scholarship

Skills

C/C++, Python, Java, Javascript, MySQL, CSS, HTML5, Node.js, Hadoop, MongoDB, Apache Spark, TensorFlow, PyTorch

Experience

Microsoft Research | Research Intern
Bangalore, India | Jan 2021 – Jun 2021
Advised by Dr. Amit Sharma

One of the primary contributors to the DiCE library [v0.5]. Implemented two model-agnostic methods to efficiently generate diverse counterfactuals in Python, wrote rigorous tests and documentation for the same. Authoring a paper on the theoretical properties satisfied by a novel feature attribution metric guided by ideas from causality, preprint available soon.

MIT Media Lab | Research Affiliate (Remote)
Boston, MA | Aug 2020 – Dec 2020
Advised by Prof. Pattie Maes

Built CNN-LSTM models (with saliency maps) on TensorFlow for automatic sleep scoring. Accompanied model predictions with Slow waves, Spindles, K-complexes, FFT & PSD plots extracted from signal data. Integrated the pipeline on a real-time open-source web-based interface using Javascript, socket programming, Node.js, Express.ejs, D3.js, and MongoDB [Code].

Uber | Software Development Intern (Remote)
Bangalore, India | May 2020 – Jul 2020

Implemented Bayesian Thompson Sampling for the Multi Arm Bandit problem in Uber's AdServer team. Worked with Java, Python, Hive, Apache Spark, SQL, HDFS, Amazon AWS Lambda. Wrote comprehensive tests (90%+ coverage), and detailed documentation to assist future users. Project resulted in 5 to 10% revenue growth for Uber's advertising sector.

Dalhousie University | MITACS Globalink Intern
Halifax, Canada | May 2019 – Aug 2019
Advised by Prof. Julien Ross

Utilized linear algebra to support 'Secure, fast, and efficient optimization of quantum circuits'. Demonstrated the steps of reducing the cost of a CNOT Dihedral quantum circuit by reducing the number of T gates and replacing them with less expensive gates [Report].

Selected Projects

Towards Robust Dialog Evaluation Metrics
CMU | Oct 2021 – Dec 2021

Designed a dialog evaluation metric that beats the state-of-the-art in human correlation on selected datasets. Work builds on previous metrics by adversarial training, contextual keyword dropout, etc., preprint available soon.

Survival Analysis for COVID-19 modelling
ACMI Lab, CMU | Jun 2021 – Aug 2021
Advised by Prof. Zachary Lipton

Built a Cox Proportional Hazards model for survival analysis of COVID-19 patients in the Allegheny Health Network database. Performed data analysis on MySQL, obtained risk scores from the model, and calibrated the model to obtain high-accuracy estimates of hospital load at future dates. Model currently deployed at Allegheny General Hospital.

Explainable Model for COVID-19 Diagnosis
TCS Research & BITS Goa | Jun 2020 – Sep 2020
Advised by Prof. Ashwin Srinivasan

Extracted domain-specific features directly from the image data using DNNs built in TensorFlow, and constructed a symbolic model for the diagnosis of COVID-19 from chest X-rays using these features. Generated visual and textual explanations, and integrated all steps in a web-based interface. [1]

Diagnosis of COVID-19 Using Chest X-Rays
TCS Research & BITS Goa | Apr 2021 – Jun 2021
Advised by Prof. Lovekesh Vig

Built a Keras segmentation model to isolate the lung region from the rest of the X-ray, and built a model to detect COVID-19 from the segmented lung. Employed embeddings of disease symptoms produced by the CheXNet network and created an ensemble for classification. Prime Minister's office is interested in using this tool for mass screening in airports and railway stations. [2]

Transfer Learning for Medical Imaging
TCS Research & BITS Goa | Jan 2021 – Mar 2021
Advised by Prof. Ashwin Srinivasan

Evaluated the efficacy of transfer of a brain-lesion model to the lung (and vice versa) by comparing against a model constructed without model-transfer and using lesion-agnostic transfer. [3]

Social Networks-based Chatbot
BITS Goa | Aug 2019 – Dec 2021
Advised by Prof. Neena Goveas

Built a platform agnostic Social Networks & NLP based Python chatbot that scrapes chat data, ranks expertise of users, suggests experts and timings for various topics extracted from the chat. [4]

Publications and Posters

[1] Constructing and Evaluating an Explainable Model for COVID-19 Diagnosis from Chest X-rays
Rishab Khincha, Soundarya Krishnan, Krishnan Guru-Murthy, Tirtharaj Dash, Lovekesh Vig, Ashwin Srinivasan [*Preprint*]

[2] CovidDiagnosis: Deep Diagnosis of COVID-19 Patients Using Chest X-Rays
Kushagra Mahajan, Monika Sharma, Lovekesh Vig, Rishab Khincha, Soundarya Krishnan, et al.
TIA, MICCAI 2020. Springer LNCS [Paper]

[3] A Case Study of Transfer of Lesion-Knowledge
Soundarya Krishnan, Rishab Khincha, Lovekesh Vig, Tirtharaj Dash, Ashwin Srinivasan
MIL3D, MICCAI 2020. Springer LNCS [Paper | Talk]

[4] Network Community Analysis Based Enhancement of Online Discussion Forums
Soundarya Krishnan, Rishab Khincha, Neena Goveas

- *ACM-W India 2020 Poster Competition: Won 1st Place [Links]*
- *YRS, CODS-COMAD 2021: Honourable Mention [Demo]*
- *WiDS Cambridge 2021: Lightning Talk [Poster]*

Achievements and Leadership

- Selected Participant, **Google Research India AI Summer School**, Aug 2020
- Recipient, **Grace Hopper Celebration India**, July 2020
- Co-founder, **BITS Goa Women in Tech**, May 2020 [Links].