Anand Gopalakrishnan | CV

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I'm a third year PhD student with Prof. Jürgen Schmidhuber at The Swiss AI Lab (IDSIA). My current research interests are broadly in unsupervised learning with a focus on discovery of symbol-like abstractions such as objects, skills, events etc. with deep neural networks. Further, I'm interested in leveraging these learned symbol-like representations to perform relational reasoning to solve various tasks in the domains of intuitive physics and video games. My long-term research goal is to build an AI agent that can "understand", reason and draw inferences about the physical world with human-level efficiency and generalisation capacities.

Education

- **Università della Svizzera Italiana** — **Lugano, Switzerland**
  PhD in Informatics — *August 2019 – present*
- **Pennsylvania State University** — **State College, PA**
  Master of Science in Electrical Engineering , GPA: 3.75/4 — *August 2017 – May 2019*
- **National Institute of Technology Karnataka (NITK)** — **Surathkal, India**
  Bachelor of Technology in Electrical and Electronics Engineering, GPA: 7.9/10 — *July 2012 – May 2016*

Publications

- **A Gopalakrishnan**, K Irie, J Schmidhuber, S van Steenkiste,"Unsupervised Learning of Temporal Abstractions using Slot-based Transformers", *Deep RL Workshop/Workshop on Offline Reinforcement Learning, NeurIPS 2021*
- **A Gopalakrishnan**, S van Steenkiste, J Schmidhuber, "Unsupervised Object Keypoint Learning using Local Spatial Predictability", *in Proc. International Conference on Learning Representations (ICLR) 2021.* Spotlight Presentation
- **A Gopalakrishnan**, A Mali, D Kifer, C.L Giles and A.G Ororbia, "A Neural Temporal Model for Human Motion Prediction" *in Proc. of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2019.*
- SR Chetupalli, TV Sreenivas, **A Gopalakrishnan**, "Comparison of Low Dimension Segment Embeddings for Robust Speaker Diarization", *in Proc. National Conference on Communications 2019.*
- SR Chetupalli, **A Gopalakrishnan**, TV Sreenivas, "Feature Selection and Model Optimization for Semi-supervised Speaker Spotting" *in Proc. European Signal Processing Conference (EUSIPCO), 2016.*
- **A Gopalakrishnan**, A Almazroa, K Rahemifar, V Lakshminarayanan "Optic Disc Segmentation using Circular Hough Transform and Curve Fitting", *in Proc. International Conference on Opto-Electronics and Applied Optics (IEM OPTRONIX), 2015.*

Research Experience

- **Masters Thesis:** *Neural Temporal Models for Human Motion Analysis*
  Advisors: Prof. C. Lee Giles and Prof. David Miller
  Designed computationally efficient (5-10x less parameters) RNN models for short and long-term motion synthesis that achieved state-of-art results as well as a novel quantitative evaluation metric for long-term human motion synthesis that correlates with human judgment.

- **Undergraduate Thesis:** *Semi-supervised and Unsupervised algorithms for Speaker Diarization*
  Advisor: Prof. T.V. Sreenivas
  In a semi-supervised setting, using 6-8 seconds of manually tagged segment of target speaker speech, achieved diarization accuracy of $\geq 90\%$ for 3-5 minutes long conversational data.

Professional Experience

- **Amazon AWS AI Labs** — **Tübingen, Germany**
  Applied Research Scientist Intern with Francesco Locatello — *June – November 2022*
  Working with the causal representation learning team on causal discovery in the intuitive physics domain.

- **Universitá della Svizzera Italiana** — **Lugano, Switzerland**
  Graduate Teaching Assistant — *September 2020 – present*
  Course: Machine Learning - designing lecture contents and organizing tutorial sessions for the unsupervised learning module, designing and evaluating assignments/exams.

- **Pennsylvania State University** — **State College, PA**
  Research Assistant with Prof. C. Lee Giles and Dr. Dan Kifer — *August 2018– May 2019*
  Developed deep generative models of human motion using motion-capture data and a novel quantitative evaluation metric for the long-term human motion synthesis setting that correlates with human judgment.

- **SPECTRUM Lab, Indian Institute of Science (IISc)** — **Bangalore, India**
  Research Assistant with Dr. Chandra Sekhar Seelamantula — *June 2016–April 2017*
  Project: 'Indic-TTS - Text-to-Speech system for Indian Languages'

- **School of Optometry and Vision Science, University of Waterloo** — **Waterloo, Canada**
  Summer Intern with Prof. Vasudevan Lakshminarayanan — *May 2015 – August 2015*
  Project: 'Automatic Glaucoma Detection from Retinal Fundus Images'

Technical Skills

- **Programming Languages:** Python | MATLAB | C++
- **Frameworks:** TensorFlow | PyTorch | scikit-learn | numpy | OpenCV | pandas | LaTeX | Git | Inkscape

Awards & Honors

- Awarded compute grant of 200,000 hours from Swiss National Supercomputing Centre for the project "Learning Structured World Models for Visual Perception and Reasoning" 2020.
- Achieved top 0.4% ranking in the All India Engineering Entrance Examination 2012.
- Awarded National Talent Search Examination Scholarship 2008 – competitive national-level scholarship given to 1000 high-school students in India.

Service

- Reviewer – *Conferences:* ICLR 2022 | NeurIPS 2022 *Workshops:* Elements of Reasoning: Objects, Structure and Causality @ ICLR 2022 | Object Representations for Learning and Reasoning @ NeurIPS 2020 | Meta-Learning workshop @ NeurIPS 2019
- Sub-reviewer – ICML 2020 | ICDAR 2019
- Chair and Founder of Signal Processing Society IEEE NITK Chapter 2015