Varun Belagali

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Education

Stony Brook, USA	**Stony Brook University**	**Aug 2022 – May 2024**

- M.S. in Computer Science, GPA: 4/4.
- Coursework: Machine Learning, Computer Vision, Robotics, Distributed Systems, Database Systems.
- Pursuing Thesis in Computer Vision advised by Prof. Dimitris Samaras.

Bengaluru, India	**R V College of Engineering**	**Aug 2016 – Aug 2020**

- B.E. in Computer Science and Engineering, GPA: 9.22/10.
- Coursework: Operating Systems, Analysis of Algorithms, Neural Networks, Data Structures, Compilers.

Research interests

- Visual Representation Learning, Vision-Language Models, Robotics.

Research Papers

1. Li, X., **Belagali, V.**, Shang, J. & Ryoo, M. S. Crossway Diffusion: Improving Diffusion-based Visuomotor Policy via Self-supervised Learning, **ICRA** 2024.

2. **Belagali, V.**, Zhou, L., Li, X. & Samaras, D. HyperMAE: Modulating Implicit Neural Representations for Efficient MAE Training, **NeurIPS** 2023 Workshop - SSLTheoryPractice23.

3. Zhou, L., **Belagali, V.**, Bae, J., Prasanna, P. & Samaras, D. INRFormer: Neuron Permutation Equivariant Transformer on Implicit Neural Representations, **NeurIPS** 2023 Workshop - NeurReps.

4. **Belagali, V.**, Rao, A. & Ghosh, P. K. Weakly supervised glottis segmentation using bounding box labels, **Interspeech** 2023.

5. Roy, A., **Belagali, V.** & Ghosh, P. K. Air tissue boundary segmentation using regional loss in real-time Magnetic Resonance Imaging video for speech production, **Interspeech** 2022.

6. Roy, A., **Belagali, V.** & Ghosh, P. K. An error correction scheme for improved air-tissue boundary in real-time MRI video for speech production, **ICASSP** 2022.

7. **Belagali, V.**, Rao, A., Gopikishore, P., Krishnamurthy, R. & Ghosh, P. K. Two step convolutional neural network for automatic glottis localization and segmentation in stroboscopic videos, **Biomedical Optics Express** 2020.

Work Experience

Graduate Researcher - CV Lab	**Stony Brook University**	**Sep 2022 – Present**

- *Representation Learning*
  Self-supervised learning: Exploring the usage of implicit neural representations to efficiently train Masked Autoencoders (MAE). Our method, HyperMAE [2], achieved comparable image classification performance to MAE while using 46% - 72% of pre-training compute.

  Weight-space representation learning: Designing permutation equivariant transformers for visual recognition from implicit neural representations by treating them as graphs [3].

- *Robotics:* Worked on improving diffusion-based visuomotor policy learning by using self-supervision [1]. State reconstruction task as self-supervision led to significant performance improvement of 17%.

Research Associate - Spire Lab   **Indian Institute of Science**   **Oct 2021 – July 2022**

- *Medical Imaging:* Designed a method for weakly supervised glottis segmentation in high-speed videoendoscopy using bounding box labels [4]. The method enhanced the segmentation quality by 20%.

- *Loss Functions:* Analyzed the drawbacks of existing deep learning methods for air tissue boundary segmentation in rt-MRI videos. Designed the use of regional losses and metrics to improve segmentation accuracy by 28.5 %[5, 6].

Software Engineer   **Citrix**   **July 2020 – Sep 2021**

- *Cloud Engineering:* Developed traffic manager tool in C# to handle cloud services during regional outages which improved time to mitigate by 20%. Led the cloud cost optimization project to reduce the cost by 65%.

Research Intern - Spire Lab   **Indian Institute of Science**   **June 2018 – July 2019**

- *Annotation Tool*: Developed annotation tool in Python for Speech-Language Pathologists to annotate glottis/vocal folds in stroboscopic videos.

- *Medical Imaging*: Designed a two-step convolutional neural network for glottis localization and segmentation from stroboscopic videos [7].

Skills

- **Languages**: Python, C++, Matlab, Java, C#, C, SQL.
- **ML libraries**: PyTorch, Keras, OpenCV, Detectron, Timm.
- **Technologies**: Azure, Jenkins, Splunk, NewRelic.

Teaching Assistant

- CSE 378: Introduction to Robotics (Undergraduate level, Fall 2023, SBU)
- CSE 416: Software Engineering (Undergraduate level, Spring 2023, SBU)
- ISE 369: Introduction to Political Informatics (Undergraduate level, Spring 2023, SBU)