Vaibhav Balloli

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EDUCATION

University of Michigan, Ann Arbor   *2023 - Present*
Ph.D. in Computer Science and Engineering
Advisor: Prof. Elizabeth Bondi-Kelly
GPA: 4.07/4.0

BITS Pilani, Hyderabad Campus   *2016 - 2020*
B.E in Electronics and Communication Engineering
GPA: 8.46/10
TOEFL: 111(R:30, L: 28, S: 25, W: 28)

RESEARCH EXPERIENCE

Microsoft Research India   *June 2022 - June 2023*
Research Fellow
Advisors: Dr. Akshay Nambi & Tanuja Ganu
Topics: Reinforcement Learning, Integer Linear Programming, Large-scale Optimization, Large Language Models.
Projects: Vasudha, VeLLM: VeLLM Press - Satya Nadella, Times of India
Impact: VeLLM is currently being deployed in schools across India

Microsoft Research India   *June 2021 - June 2022*
SCAI Research Fellow
Advisors: Dr. Akshay Nambi, Tanuja Ganu & Dr. Venkat Padmanabhan
Topics: Computer Vision, Contextual Bandits, Visual Localization, End-to-End systems
Projects: HAMS: HAMS Press - Punjab News Express
Impact: HAMS is successfully deployed across India

PUBLICATIONS

Conference Publications

3. **Are They the Same Picture? Adapting Concept Bottleneck Models for Human-AI Collaboration in Image Retrieval**
   Vaibhav Balloli, Sara Beery, Elizabeth Bondi-Kelly
   Topics: Human-AI Collaboration, Image Retrieval, Wildlife Conservation
   IJCAI'24 Human-Centered AI Track | Code | Project | **-** **<5% Acceptance Rate**

2. **Chanakya: Learning Tradeoffs for Adaptive Streaming Perception via Contextual Bandits**
   Anurag Ghosh, **Vaibhav Balloli**, Akshay Nambi, Aditya Singh, Tanuja Ganu.
   Topics: Human-AI Collaboration, Image Retrieval, Wildlife Conservation
   NeurIPS'23 | Talk | Code

1. **Video Streaming using Scalable Video Coding over Opportunistic Networks**
   Abhishek Thakur, **Vaibhav Balloli**, Arnav Dhamija.
   Topics: Human-AI Collaboration, Image Retrieval, Wildlife Conservation
   WiSPNET'19 | Code

Workshop papers

1. **Are They the Same Picture? Adapting Concept Bottleneck Models for Human-AI Collaboration in Image Retrieval**
   Vaibhav Balloli, Sara Beery, Elizabeth Bondi-Kelly
   Topics: Human-AI Collaboration, Image Retrieval, Wildlife Conservation
   CVPR'24 @ CV4Animals Workshop

Theses

1. **Multi-objective Neural Architecture Search via Reinforcement Learning**.
   Vaibhav Balloli.
   Undergraduate Thesis, 2020. A Grade.

Under review

2. **Bridging the Gap: Dynamic Learning Strategies for Improving Multilingual Performance in LLMs**
   Somnath Kumar*, **Vaibhav Balloli***, Mercy Ranjit, Kabir Ahuja, Tanuja Ganu, Sunayana Sitaram, Kalika Bali, Akshay Nambi
   Topics: Large Language Models, Multilingual Evaluation, Human Feedback.
   Preprint

1. **EnCortex: A General, Extensible and Scalable Framework for Decision Management in New-age Energy Systems**
   Vaibhav Balloli*, Millend Roy*, Anupam Sobti, Tanuja Ganu, Akshay Nambi.
   Topics: Large-scale Reinforcement Learning(Model-free, Offline), Imitation Learning, Integer Linear Programming.

SOFTWARE

1. **EnCortex - Stochastic Optimization for Renewable Energy sources**.
   Microsoft Research India
   Reinforcement Learning(PyTorch, Stable-Baselines3) | Stochastic Optimization | MLOps on Azure.
   RL and Stochastic optimization algorithms running large-scale optimizations that are currently used by customers at Microsoft to maximize their profitability and sustainability goals.

2. **Automated License Testing - Microsoft Research India**.
   Microsoft Research India
   This system contains Computer Vision algorithms that perform Visual SLAM, Object Detection, and Trajectory analysis. As of August 2022, ♥ 4 sites have been deployed successfully in different parts of India.

INTERNSHIPS

1. **IST Austria**
   ●Explored how RL algorithms can be adapted for Structured Pruning(channel, 2:4 sparsity) in computer vision models.

2. **AlphaICs**
   ●Devised efficient data structures, algorithms, and protocols for AlphaIC's hardware accelerator and deep learning library.
   ●Built an application in Python for the inter-operability of deep learning models and quantization of these models for faster inference using TensorFlow, ONNX, and PyQT5.

PROJECTS

1. **Offlax**
   Offline Reinforcement Learning library in JAX. Implements SOTA algorithms with an efficient file IO interface.

2. **NFNets and Adaptive Gradient Clipping GitHub 340★**
   Re-implemented DeepMind's NFNets and Adaptive Gradient Clipping for all optimizers in PyTorch..

3. **SmartCampus**
   ●Co-founded SmartCampus, a student group that built Cashless system on campus, handling transactions worth 25 million rupees during my tenure.
   ●Built an Android app and a web backend on a free server to handle **3000 active users per minute**.
   ●Built a prototype recommender system using information retrieval and modern recommender system techniques.

4. **VECTORS**
   ●Scalable Video Coding encoded video on a DTN(Disruption Tolerant Network) developed for Android devices under the supervision of Dr. Abhishek Thakur.
   ●Developed an Android App cross-compiling SHM and JSVC for ARM processors to encode recorded video to send on the network
   ●Used Opportunistic Network Environment(ONE) to run simulations and automatic generation of reports from results.

5. **Open Source: Google's Swift For Tensorflow, JAX/Flax**
   - Contributed to the core framework implementing different optimization algorithms and layers.
   - Image classification models to the Swift for TensorFlow models repository.
   - Feature additions to JAX/Flax.

SELECT AWARDS AND HONORS

- Awarded Weinberg Institute Travel Grant to attend CVPR'24 - $1000 *2024*
- 2nd Place in the Google x MHacks Hackathon - $1500 Press: Mentioned by **labs.google** *2024*
- **Press:** VeLLM mentioned by Satya Nadella and featured in Times Of India, FirstPost *2024*
- Awarded Rackham Travel Grant to attend and present at NeurIPS'23 *2023*
- Selected for the Harvard/MIT - HAIST/MAIA Intro Fellowship on AI Safety *2023*
- **Press:** HAMS Automated License Testing featured in Punjab News Express *2022*
- **Winner** of Microsoft Global Hackathon, 2021(Future Of Edge Computing Track) *2021*
- **SmartCampus** successfully managed ₹**25 million** in transactions *2020*
- Talk at WiSPNET'19 presenting our paper Video Streaming using Scalable Video Coding over Opportunistic Networks(VECTORS) *2019*

SERVICE

- Reviewer for NeurIPS'24.
- Reviewer for CompSust Workshop @ NeurIPS'23.
- Reviewer for CV4Animals Workshop @ CVPR'24.

PROFESSIONAL RESPONSIBILITIES

- Selected as Teaching Assistant for ClimateChange.ai Summer School *2023*
- **Head of SmartCampus** at BITS Pilani Hyderabad Campus
- **Member of Automation and Robotics Club** at BITS Pilani Hyderabad Campus. Organized microcontroller workshop for a group of 100 students
- **Volunteer** at ClimateChange.ai
- **Founder and Organizer** of ML Reading Group at BITS Pilani Hyderabad Campus
- **Mentorship**
  - Jonathan Samuel (Research Intern @ MSR -> SDE Gojek)
  - Isha Singh (Research Intern @ MSR)