SWASTI SHREYA MISHRA

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INTERESTS

Computer Vision, Controlled Video Generation, Customization of Text-to-Image Generation Models (Stable Diffusion), Human-centred Artificial Intelligence, Machine Learning

EDUCATION

- **Integrated Master of Technology, International Institute Of Information Technology Bangalore** 2017 - 2022
  Bachelor of Technology in Computer Science Engineering
  Master of Technology in Artificial Intelligence and Machine Learning
  Cumulative GPA: **3.75/4**

PUBLICATIONS

[1] Aishwarya Agarwal, Anuj Srivastava, Inderjeet Nair, **Swasti Shreya Mishra**, Vineeth Dorna, Sharmila Reddy Nangi, Balaji Vasan Srinivasan. **SketchBuddy: Context-Aware Sketch Enrichment and Enhancement**. In *ACM Multimedia Systems Conference* (ACM MMSys 2023). [LINK]

[2] **Swasti Shreya Mishra**, Kumar Shubham, and Dinesh Babu Jayagopi. **A Hybrid Rigid and Non-Rigid Motion Approximation for Generating Realistic Listening Behavior Videos**. In *Indian Conference on Computer Vision, Graphics and Image Processing* (ICVGIP 2022). [LINK]

[3] Prateksha Udhayanan, **Swasti S Mishra**, and Shrisha Rao. **Firm Dynamics and Employee Performance Management in Duopoly Markets**. In *Physica A: Statistical Mechanics and Its Applications* (583:126298, 2021). [LINK]

MANUSCRIPTS UNDER REVIEW

[1] **Swasti Shreya Mishra**, Tripti Shukla, Srikrishna Karanam, Balaji Vasan Srinivasan. **Controllable Conditioning in Graphic Design Layout Generation**.

WORK EXPERIENCE

- **Research Associate - Adobe Inc.** Jul 2022 - Present
  Group: Collaborative Creativity *Bangalore, India*
  - Engaged in several projects involving Controlled Video Generation, Multimodal Design Understanding, Graphic Design Layout Generation and Optimization, and Customization of Text-to-Image Generation Models (diffusion models).

- **Research Intern - Awl Japan** Jan 2022 - Apr 2022
  Topic: Real-time Human Object Tracking *Kin Wah Edward Lin*
  - Extensively analyzed **multi-object tracking** models and their evaluation metrics.
  - Generated **synthetic dataset** for human-object tracking using the video game - Grand Theft Auto V's mod.
  - Worked on adapting a state-of-the-art human-object tracking model for a client use case using a **single-shot** framework for **joint detection and embedding** learning.

- **Mitacs Globalink Research Intern - University of Waterloo** Aug 2021 - Oct 2021
  Topic: Building-height Estimation *Prof. Dr. Chul Min Yeum*
  - Worked on building-height estimation using **Deep Learning** frameworks for Flood Risk Analysis.
  - Curated and post-processed **street-view images dataset** using Google Maps - Street View Static API.
  - Developed a **convolutional neural network (CNN)** along with utilizing the **depth features** to estimate the first-floor height in street-view images.

- **Research Intern - Adobe Inc.** May 2021 - Aug 2021
  Topic: Context-Aware Sketch Enrichment and Enhancement *Sharmila Nangi, Dr. Balaji Vasan Srinivasan*
  - Worked on **context-aware scene enrichment** and **enhancement** to aid the designers in their ideation phase.
  - Proposed a novel **context-aware recommendation framework** for quicker illustrations in **sketch domain**.
  - Explored deep learning architectures such as **RetinaNet** and **FRCNN** for object detection, **Variational Auto-Encoder** and **ResNet** for sketch representation, **Visual-Transformers** (Masked Region Predictor) to capture context, and **U-Net** for saliency map generation.
  - Extended the proposed frameworks to **UI/UX designs** domain by giving recommendations for parallelly enhancing **UI sketches** to a **lo-fi prototype** thereby allowing rapid iterations between the sketch domain and the prototyping domain.

- Published in **ACM MMSys 2023**.

- **Research Intern - BIOTEC, TU Dresden** May 2020 - Jul 2020
  Topic: Biological Pathway Enrichment Analysis *Prof. Dr. Carlo V. Cannistraci*
  - Worked on machine learning and database integration for network-based biological pathway enrichment analysis.
  - Implemented a text mining-based approach using **word2vec embeddings** and **Latent Dirichlet Allocation (LDA2Vec)** that searches for lipid signatures and biological pathways in the published literature.
  - Developed a framework to automatically populate a graph database - **Neo4j** with lipid signatures and biological pathways.

- **Software Engineering Intern - Microsoft Corp.** Jun 2019 - Jul 2019
  Topic: Interview Scheduling App *Kausik Ghatak*
  - Automated the process of interview scheduling for organizations by developing a web and mobile app using **React/React Native**, **Django** frameworks and **Azure Services** (such as Notification Hub and SQL Server).
  - Utilized **Microsoft Graph APIs** such as Outlook Calendar API and Teams API to personalize the app for users.
  - Reduced the overhead costs of fetching data from the backend by changing the app's architecture.
  - Made the app production-ready.

KEY PROJECTS

- **Text-to-Video Generation** Jan 2023 - Present
  Adobe Research *Dr. Kuldeep Kulkarni, Dr. Duygu Ceylan*
  - Developed a method for text-to-video generation by leveraging text-to-image diffusion models **(ControlNet, Stable Diffusion)**.
  - Proposed an approach that outperforms current state-of-the-art methods by maintaining better temporal coherence and allows the synthesizing of novel videos based on text conditioning.

- **Controllable Conditioning in Graphic Design Layout Generation** Jul 2022 - Dec 2022
  Adobe Research *Dr. Srikrishna Karanam, Dr. Balaji Vasan Srinivasan*
  - Proposed a novel **semantics-aware learning objective** that **disentangles** a graphic design layout's features semantically concerning the input modalities during the learning process.
  - Learnt a mapping from the latent space of the Variational Auto-Encoder model to a **conditional latent space** that controls model outputs with various aspects such as visual content, textual content, category types, and their proportions on the layout canvas using the **Maximum Mean Discrepancy (MMD) learning objective**.

- **Listening Behavior Video Generation** Dec 2021 - Jun 2022
  International Institute of Information Technology Bangalore *Prof. Dr. Dinesh Babu Jayagopi*
  - Proposed a **one-shot DeepFake generation model** to transfer an actor's behavior onto a single facial image that can be used for psychological studies.
  - Analyzed the effects of listening behaviors on meta-perception and other-perception.
  - We propose a **hybrid** model that combines **first-order and zero-order motion**, improving the output quality and preventing distortion, especially in non-rigid body motions.
  - Published in **ICVGIP 2022** and the complete **Thesis** is available here.

- **Building Agent Capable of Playing Text-Based Games** Jan 2021 - Apr 2021
  International Institute of Information Technology Bangalore *Prof. Dr. G. Srinivasaraghavan*
  - Built a **reinforcement learning agent** that can navigate and interact within a text environment, using language understanding, dealing with a combinatorial actions space, efficient exploration, memory, and sequential decision-making.
  - Our approach leverages **Knowledge Graph**, **Stanford OpenIE triples**, **Graph Attention** and **Advantage Actor-Critic** Network.
  - Our implementation can be found on Github.

- **Blind Handwritten Document Deblurring** May 2020 - Dec 2020
  International Institute of Information Technology Bangalore *Prof. Dr. Dinesh Babu Jayagopi*
  - Built a **Generative Adversarial Network (GAN)** that can learn to deblur images, scene text and text documents. The objective was to use **non-kernel** estimation-based method to tackle this task.
  - Curated and processed a dataset of handwritten documents for deblurring using various **Gaussian Noise Kernels**.
  - Trained a **DeblurGAN-v2** model to deblur the images.
  - Proposed a new loss document deblurring leveraging **Mean Gradient Error**.

- **Real-Time Attire Classification** Apr 2020 - May 2020
  International Institute of Information Technology Bangalore *Prof. Dr. Dinesh Babu Jayagopi*
  - Curated and processed a dataset using **MaskedRCNN** and **YOLO** object detection models on Youtube videos.
  - Fine-tuned **pre-trained AlexNet** and **ResNet** for attire classification.
  - Developed a **pipelined framework** for real-time human detection and attire classification using the above models.
  - Our implementation can be found on Github.

TEACHING EXPERIENCE

- Undergraduate Teaching Assistant for *Visual Recognition* course at IIIT Bangalore 2022
- Undergraduate Teaching Assistant for *Machine Learning* course at IIIT Bangalore 2021

MISCELLANEOUS PROJECTS

- **Room Layout Estimation** – Built a **U-net**-based architectural model for the reconstruction of the enclosing structure of the indoor scene, consisting of walls, floor, and ceiling without making any assumption on the room structure, such as cuboid-shaped or Manhattan layouts. This model is trained on the **Structred3D** dataset. Github repository.
- **Travel Duration Prediction for BMTC Buses** – Built a travel duration prediction model for Bangalore Metropolitan Transport Corporation (BMTC) buses. This involved cleaning up the raw data (15GB), exploratory data analysis and feature extraction. Experiments were conducted to find out the best-fitting machine learning model. Github repository.
- **Building Full Stack Application using DevOps Methodology** – Built an app, where the frontend was built using **React** and the backend was built using **Django**. Testing was done using **PyTest**. Continuous integration was done using **Jenkins**, containerization with Docker and **DockerHub**, continuous deployment using **Ansible** and continuous monitoring using the **ELK** stack. Github repository.
- **LinkedIn Movements Page** – Built a Movements Page for LinkedIn Wintathon (Hackathon). This is a platform for people to come together and raise their concerns for a specific cause. Used **ReatJS** for frontend, **Django** for backend and **FastText embeddings-based similarity** for recommending the most relevant movements for users.

RELEVANT COURSES AND TOOLS

- **Artificial Intelligence and Machine Learning Courses:**
  Artificial Intelligence, Visual Recognition, Natural Language Processing, Multi-Agent Systems, Machine Learning, Mathematics for Machine Learning.
- **Computer Science Courses:**
  Data Visualization, Computer Graphics, Graph Theory, Software Production Engineering, Programming Languages, Operating Systems, Introduction to Automata Theory and Computability, Discrete Mathematics, Data Structures and Algorithms, Design and Analysis of Algorithms, Database Systems, Programming (Python, C, Java, C++), Software Engineering.
- **Tools and technologies:**
  Python (Pytorch, Numpy, Pandas, Scikit-learn, Scipy, Seaborn, Matplotlib), C/C++, JavaScript, Java, CypherQL, SQL, Jupyter, LaTeX, React/React Native, Git, Neo4j, HTML, CSS.

ACHIEVEMENTS

- Awarded **Late Sri. N. Rama Rao Medal for All-Rounder of the Year**, International Institute Of Information Technology, Bangalore – 2022
- Awarded **Dean's Merit List**, International Institute Of Information Technology, Bangalore – 2017-2022
- Awarded **Adobe Women in Technology Scholarship**(1 among 6 scholars in India) – 2021
- Qualified for **ACM-ICPC (Association for Computing Machinery - International Collegiate Programming Contest)**, India Regionals (Kharagpur and Amritapuri) – 2018
- Won **Google 'Build For India' Hackathon**, Google Bangalore, secured 1st position in the Android Track – 2018

EXTRA-CURRICULARS

- Published a poetry book **"Dimensional Thoughts"** in 2023
- Volunteered as a mentor for the **Women in Machine Learning & Data Science**, New Delhi Chapter in 2021
- Founder member of Dance Club IIIT Bangalore, 2018-2022