Jaisidh Singh

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Education

Indian Institute of Technology Jodhpur *Dec 2020 to May 2024*
Bachelor of Technology in AI and Data Science *Jodhpur, India*

Relevant Coursework

Deep Learning (A*), Dependable AI (A), Optimization in ML (A), Pattern Recognition and ML (A), Speech Understanding (A), Decision Making and RL (A-), Computer Graphics (A-), Linear Algebra and Differential Equations (A-), Probability and Statistics (A-), CS231N†: Stanford Computer Vision, Nvidia-DLI†: Transformer Applications in NLP.
†: indicates completion in self-learning mode.

Publications

In review/preprints

- Learn "No" to Say "Yes" Better: Improving Vision-Language Models via Negations **ArXiv preprint:**
  Jaisidh Singh*, *Ishaan Shrivastava**, *Mayank Vatsa*, *Richa Singh*, *Aparna Bharati*

Published

- SynthProv: Interpretable Framework for Profiling Identity Leakage **Paper: Supplement:**
  Jaisidh Singh, *Harshil Bhatia*, *Aparna Bharati*, *Richa Singh*, *Mayank Vatsa*, WACV 2024.
- IdProv: Identity-Based Provenance for Synthetic Image Generation (Student Abstract) **Paper:**
  *Harshil Bhatia**, ***Jaisidh Singh****, *Gaurav Sangwan*, *Aparna Bharati*, *Richa Singh*, *Mayank Vatsa*, AAAI 2023.

*: indicates equal contribution

Research Experience

MILA | Remote Research Associate *May 2024 to Present*
With Diganta Misra *Quebec, Canada*

- Designing a zero-shot **generator of alignments between image and language** encoders.
- Devising **hypernetwork frameworks for dynamic parameter predictions** of the alignment.
- Worked on **zero-budget additions of image or text encoders** using the hypernetwork.

MILA | Remote Research Associate *Jan 2024 to March 2024*
With Diganta Misra *Quebec, Canada*

- Investigated **alternative techniques** to transformer pretraining **using Mixture-of-Experts**.
- Devised MoE training **paradigms with periodic merging and redistribution of experts** to transformer MLP.
- Worked on **novel merging methodologies and router re-initializations** for robust pretraining.

Trusted AI and Biometrics Lab | Undergraduate Researcher *July 2023 to Present*
With Dr. Aparna Bharati, Prof. Richa Singh, Prof. Mayank Vatsa *IIT Jodhpur, India*

- Developed a **high-quality dataset with fluent negation-based false captions** for image-text matching.
- Proposed **novel modifications** to CLIP's contrastive loss for **improved negation understanding**.
- Resultant model shows **reduced spurious encoding** and **improved performance** on non-negation related tasks.

Trusted AI and Biometrics Lab | Undergraduate Researcher *May 2022 to Jan 2023*
With Dr. Aparna Bharati, Prof. Richa Singh, Prof. Mayank Vatsa *IIT Jodhpur, India*

- Developed a **novel framework for profiling identity leakage**
- Showed how **StyleGAN2's latent space** foundationally **encodes face-recognition**.
- Published at **AAAI Student Abstracts 2023** and **WACV 2024**.

Industrial Experience

Bosch Research India | ***Research intern*** *May 2023 to Jan 2024*
With Dr. Amit Arvind Kale, Sonam Singh *Bengaluru, India*

- Investigated **diffusion-based inpainting** in autonomous driving data.
- Devised a **framework for interpretable failure discovery** in segmentation.
- Developed method achieved **93.5 % accuracy** on BDD100K and ACDC.

Bosch Research India | ***Research intern*** *May 2022 to July 2022*
With Sonam Singh *Bengaluru, India*

- **Developed image retrieval pipelines** which were **modular and plug-and-play**.
- Devised **prompts for CLIP in attribute-aware multimodal image retrieval**.
- The framework developed was used for subsequent research and automation.

Presentations and Talks

- SynthProv: Interpretable Framework for Profiling Identity Leakage **Poster: Presentation:**
  Jaisidh Singh, *Harshil Bhatia, Aparna Bharati, Richa Singh, Mayank Vatsa*, WACV 2024.
- IdProv: Identity-Based Provenance for Synthetic Image Generation (Student Abstract) **Poster:**
  Harshil Bhatia, **Jaisidh Singh***, Gaurav Sangwan, Aparna Bharati, Richa Singh, Mayank Vatsa*, AAAI 2023.

Technical Skills

Areas of research: deep learning, computer vision, NLP, explainable AI
Languages: Python, LaTeX, JavaScript, Dart, Bash, C++
ML-DL frameworks: PyTorch, HuggingFace, Jax, Flax, Scikit-learn, NumPy
Other technologies: Selenium, ReactJS, NodeJS, Flutter, Linux, Git, GraphQL

Projects

`quickmatch` - **Python library** | *Python, PyTorch* **GitHub: PyPi:**

- A fast and easy command-line tool for using SOTA face-matchers.
- Embeds face images to face-matcher embedding spaces in one line, across all hardware accelerators.
- Supports ElasticFace, ArcFace, SphereFace, and FaceNet.

`loraclip` - **Python library** | *Python, PyTorch* **GitHub: PyPi**

- An efficient wrapper for inserting LoRA layers into CLIP for parameter-efficient fine-tuning.
- Developed custom LoRA insertions into both vision and language encoders at less than 1% of the original parameters.
- Seamlessly functions like the default CLIP code and with automatic checks for parameter anomalies.

Large Document Summarization | *Python, PyTorch* **GitHub: HuggingFace**

- A project for summarizating oflarge articles, in a purely inference-based, plug-and-play manner.
- Used hierarchical sentence clustering for extractive summarization.
- Presented as the DL-Ops project for Deep Learning 2023 @ IIT Jodhpur.

Achievements

- Achieved **99.43 percentile** and **6428 rank** out of 1.5 million applicants during **JEE Mains 2020**, with **rank 3214 in JEE Advanced 2020**.
- Secured **top ranks in several regional level Olympiads** and awarded with a laptop by the Science Olympiad Foundation.

Extracurricular

Student Guide *2021*
Student Wellbeing Committee *IIT Jodhpur*

- Mentored 10 mentees personally and professionally.
- Worked with a team of 46 to handle a batch of 500 students.

Core Member *2021*
Music Society, Quiz Society, Literature Society, DevIUp Labs *IIT Jodhpur*

- Seasoned guitarist, vocalist, avid reader.
- Performed at cultural events like Inter-IIT Cultural Meet 2023 & 2024, Ignus 2023, etc.
- Assumed collaborative and leadership roles in coordinating activities with juniors.