Amol S. Joshi

asj00003@mix.wvu.edu | www.linkedin.com/in/ajoshi944 | ajoshi944.github.io | 681-285-9024

Education

PhD in Computer Science **2021 – Present**
West Virginia University
Dissertation: Applications of Deep Learning for Optimizing Fingerphoto and Latent Fingerprint Biometrics
Coursework: Deep Learning, Applications of Neural Networks, Pattern Recognition, Computer Vision

Master of Science in Information Technology **2016 – 2019**
Sikkim Manipal University DDE
Coursework: Data and File Structures, Analysis and Design of Algorithms, Operating System, Embedded Systems

Bachelors of Science in Computer Science **2013 – 2016**
Pune University
Coursework: Data Structures, Object Oriented Concepts, Theoretical Computer Science, Compiler Construction

Experience

West Virginia University **2021 – Present**
Research Assistant

- Image Deblurring: Designed and implemented a **Generative Adversarial Network (GAN)** for deblurring fingerphotos, significantly improving image clarity and recognition accuracy. A **patent** is pending for the algorithm.
- Quality Assessment: Developed a comprehensive, **data-driven labeling** approach for fingerphotos, enabling **automated** quality assessment in biometric systems.
- Image Enhancement: Applied advanced techniques in latent fingerprint enhancement, focusing on **ridge pattern** and **minutiae point** detection. Utilized a style transfer-based approach to skeletonize images, improving the accuracy of latent fingerprint recognition systems.
- Synthetic Image Generation: Addressed data scarcity in the biometric domain by proposing a **style transfer-based** method to generate synthetic fingerprints that preserve the statistical distribution of real biometric data, enhancing **model training efficiency**.

RTA Technologies **2018 – 2019**
Jr. Data Engineer

- Designed and implemented a scalable product recognition system using a **NoSQL database** and integrated **Google Vision API** for accurate text recognition. The system streamlined **real-time product identification**, enhancing user experience and operational efficiency.
- Collaborated with developers and project managers using Agile methods to deliver projects and release features on time.

Projects

Fingerphoto Deblurring Using Attention-guided Multi-stage GAN | Paper I Paper II

- Developed a **guided-attention-based** multi-task, multi-stage generative model, incorporating a **deep fingerphoto verifier** to preserve identity information and a **blur-type classifier** to learn the type of blurring.
- Improved recognition accuracy on naturally blurred samples from 69.39% to 95.02%.

UFQA: Utility guided Fingerphoto Quality Assessment | Paper

- Used **ResNet18 architecture** in the **self-supervised dual encoder** framework for feature fusion in latent space.
- Trained the network with the quality maps from **NIST Mindtct** tool to address **local distortions** in fingerphotos.

Synthetic Latent Fingerprint Generation Using Style Transfer | Paper

- Proposed a simple, effective method using self-attention-based instance normalization to transfer the **style** of latent fingerprints from public datasets.
- Evaluated the **similarity** of synthetic latent fingerprints using genuine minutiae points, t-SNE distributions, and image quality metrics.

Other Projects

- **CMPA** – An Android platform for scanning agrochemical product labels using an **OCR technique**.
- **Satellite Imagery in Agriculture** – Developed and deployed a **segmentation** model on **Microsoft Azure** to enhance the effectiveness of **satellite imagery** for agricultural applications.

Skills

Languages/Database: Python, C#, SQL
Libraries: PyTorch, PyTorch Lightning, Scikit-Learn, OpenCV
Tools: Git, Cloud Services