Aref Tabatabaei

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PROFESSIONAL PROFILE

Computer Vision Engineer and Machine Learning Researcher with hands-on experience developing and deploying deep learning systems. Skilled in building end-to-end solutions from algorithm design to production deployment, with expertise in PyTorch, TensorFlow, OpenCV, and modern generative models (GANs, diffusion, transformers). Proven track record of research contributions, including first-author publications at ICLR Tiny Papers and arXiv. Experienced in image generation, semantic segmentation, object detection, medical image segmentation, and multimodal learning. Strong software engineering foundation with full-stack development and scalable ML deployment using Docker, APIs, and cloud-ready pipelines.

SKILLS & COMPETENCIES

Programming Languages	Python, C/C++, Golang, JavaScript
Machine Learning & Computer Vision	PyTorch, TensorFlow, OpenCV, NumPy, Scikit-learn, Diffusers, MediaPipe, YOLO, MONAI
Frameworks & Development	Docker, ROS, FastAPI, Django, React, PyQt
3D Graphics & Game Engines	Blender, Godot, Unity
Databases & Data Management	MySQL, PostgreSQL, Redis
Scientific & Professional Tools	Linux, Git, LaTeX, Microsoft Office
Design & Visualization	Adobe Premiere, Adobe After Effects

WORK EXPERIENCES

Sayal Sanjesh — *Dec. 2024 - Current*

Full-Stack Web Developer

- Developed and maintained a smart water management system with real-time meter control. Implemented the backend using Django and frontend with React. Collaborated with the hardware team by integrating an MQTT broker to enable reliable communication with smart water meter devices. Applied cybersecurity best practices—including authentication, API security, and data protection—as part of a project under AFTA (Iranian Cyber Security Degree).

Amirkabir University of Technology — *Dec. 2022 - Jan. 2024*

Undergraduate Research Assistant Under the Supervision of Prof. Maryam Amirmazlaghani | Statistical Machine Learning LAB

- **Text Integration Into Image**: Led a research project focused on embedding text within images while preserving visual coherence. Resulted in a published paper at the International Conference on Learning Representations (**ICLR**) Tiny Papers, where I served as the **primary author**.
- **Artifact Removal**: Conducted research to remove artifacts in virtual try-on and pose transfer tasks, resulting in a paper with a preprint available on arXiv, for which I was the **lead author**.
- **Image Generation & Denoising**: Worked with U-Net, GANs, and diffusion models, focusing on both mathematical foundations and implementation for image synthesis and processing tasks.

Allostasis — *May. 2022 - Dec. 2022*

Computer Vision Developer

- **Custom Avatars**: Developed a pipeline to generate personalized 3D avatars from client images, working extensively with 3D file formats (GLTF, OBJ) and automation in Blender for mesh manipulation and rendering.
- **Human Detection & Tracking System**: Implemented real-time multi-person detection and tracking using MediaPipe and OpenCV, enabling robust posture-based control for interactive systems.
- **Avatar Control**: Integrated real-time camera input with Godot Engine, enabling dynamic avatar movement driven by user gestures and facial cues.
- Production Deployment: Dockerized multiple CV and game engine components for seamless deployment and scalability, including API services, real-time processing modules, and Blender-based rendering pipelines.

SELECTED PROJECTS

- **Medical Image Segmentation with MONAI (Prostate MRI)**: Implemented 3D prostate MRI segmentation using MONAI with the SwinUNETR architecture. Applied advanced 3D augmentations, transfer learning, and DiceCELoss, achieving accurate segmentation results on the Medical Segmentation Decathlon dataset. (MONAI, PyTorch, SwinUNETR, Medical Imaging) Github Link
- **Sign Language Action Recognition with LSTMs:** Developed an action recognition pipeline for WLASL dataset using keypoints extracted via MediaPipe. Designed custom LSTM models (PyTorch Lightning) and benchmarked against Keras baselines, evaluating performance with confusion matrices. (PyTorch, Keras, LSTM, MediaPipe, WLASL) Github Link
- **Image Captioning with Transformers**: Designed encoder–decoder architecture with ResNet50 visual encoder and Transformer decoder, enhanced with beam search and verification steps for better inference. (PyTorch, Transformers, ResNet50) Github Link
- **Latent Age Control with StyleGAN1**: Implemented StyleGAN1 from scratch and discovered latent-space boundaries to manipulate facial age. (PyTorch, GANs, FFHQ, CelebA) Github Link
- **YOLOv8 from Scratch:** Rebuilt YOLOv8 architecture from backbone to detection head, implementing DFL, classification, and localization losses. (PyTorch, COCO, Object Detection) Github Link
- **Inpainting with Reference Guidance:** Fine-tuned Stable Diffusion inpainting by extending the UNet to condition on masked images and external references. Improved coherence in object/region restoration using COCO-derived datasets. (PyTorch, HuggingFace Diffusers, Stable Diffusion, COCO) Github Link
- **Vision Transformer (ViT) from Scratch on CIFAR-10:** Built a ViT model from scratch, implementing patch embedding, multi-head attention, and positional encodings. Trained on CIFAR-10 and visualized attention maps and learned embeddings. (PyTorch, Transformers, CIFAR-10) Github Link
- **Cloth Segmentation with UNet**: Designed a UNet-based segmentation model for clothing region extraction from human images, supporting fashion AI and virtual try-on applications. (PyTorch, OpenCV, UNet) Github Link

EDUCATION

Amirkabir University of Technology *Sep. 2019 - Jan. 2024*

Bachelor of Science in Computer Engineering

- **Selected Courses:** Computational Intelligence | Applied Linear Algebra | Algorithm Design | Engineering Statistics | Robotics | Database Design

PUBLICATIONS

ICLR Tiny Paper (2024)

- No More Blah-Blah: Embracing Real Text in the Image Synthesis World – First Author

Preprint (2024)

- A Conditional Inpainting Approach for End-to-End Artifact Removal in VTON and Pose Transfer – First Author

LEADERSHIP & VOLUNTEERING

- Head TA – Linear Algebra
- TA – Robotics, Embedded Systems, Algorithm Design
- Technical Staff – Linux Fest, Game Craft (Unity), AAISS Summer School

LANGUAGES

English
Professional proficiency

Persian
Native proficiency

Japanese
Elementary proficiency

ASL
Basic proficiency

AWARDS AND ACHIEVEMENTS

- **Best Bachelor of Science AI Thesis – Amirkabir University, AAIC 2024**
- **Winner, 800m Running – Yazd Province Championship 2014**
- **Second Place, 3000m Running – Middle and South Region, Iran 2014**
- **Multiple Medals in Soccer – Yazd Province Competitions 2012 - 2017**