

# Akshay Umesh

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## EDUCATION

New Jersey Institute of Technology, New Jersey

*M.S. Computer Science*

Sep 2023 - May 2025

**Relevant Courses:** Data Structures, Algorithms, Object Oriented Programming, Assembly & C Programming, Databases, Computer Systems, Machine Learning, Deep Learning, Natural Language Proc, Artificial Intelligence.

## WORK EXPERIENCE

Accenture, Remote

Sep 2021 - Aug 2023

*AI/ML Engineer*

- Automated pipelines for KP-HIE using Selenium, Jira, and Jenkins, **reducing manual test time by 40%** and accelerating model deployment validation cycles.
- Adopted Agile and CI/CD practices across data validation workflows, **cutting sprint delivery timelines by 30%** and improving cross-team responsiveness.
- Optimized testing frameworks for Kaiser's Genomics and NIPT projects, enhancing test reliability and **ensuring 99% accuracy in data validation results**.

## PROJECT EXPERIENCE

**Micro-Budget Latent Diffusion Transformer for High-Resolution Image Synthesis**

Jan 2025 - May 2025

- Trained a 1.2B-parameter Latent Diffusion Transformer on 25M image-caption pairs, achieving 12.7 FID on COCO **while reducing compute cost by 40%** through optimized checkpointing and efficient batching.
- Designed a scalable training workflow that dynamically adjusts embeddings across resolutions, **reducing fine-tuning time by 30%**.
- Boosted representation efficiency by 40%** using a patch-masking strategy and lightweight patch-mixer, cutting sequence length by 3× while preserving global semantics and **improving downstream sample fidelity by 15%**.

**Transformer-based Autoregressive Image Generation using VQGAN**

Nov 2024 - Jan 2025

- Engineered a 108M-parameter model to enable autoregressive image synthesis, achieving **15% higher FID improvement** over baseline.
- Implemented quantization with gradient-flow reparameterization for stable backpropagation through discrete latents and optimized training, **reducing GPU memory usage by 40%**.
- Designed discrete neural representations using ResNet encoder-decoder, self-attention, and multi-objective loss (reconstruction, perceptual, adversarial, quantization, commitment) to enhance latent code structure.

**U-Net for Image Reconstruction**

Nov 2024 - Jan 2025

- Implemented a U-Net architecture from scratch in PyTorch, **achieving 20% higher reconstruction fidelity** and 16× latent compression efficiency for image generation tasks.
- Optimized model training with mixed precision and custom Kaiming initialization, **cutting GPU memory usage by 50%**, improving training stability, and enabling 2× larger batch sizes on A100 GPUs.
- Enhanced feature retention and realism through skip connections, multi-stage self-attention, and residual feed-forward layers, **yielding 15% higher SSIM**.

## TECHNICAL SKILLS

**Programming:** Python, Java, JavaScript, SQL

**Machine Learning:** Machine Learning, Deep Learning, Generative AI, Cross-Modal / Multimodal Generative Modelling, Computer Vision, Natural Language Processing, Autoregressive Modelling, RAG

**Frameworks:** PyTorch, LangChain, Express.js, Node.js, React, HTML, CSS, MongoDB

**Tools & Platforms:** Docker, Git, AWS