Tushar Parmanand Budhwani

📞 +1(413)-466-1132 ✉ tbudhwani@umass.edu 🌐 tusharbudhwani.tech 🔗 tusharbudhwani 🐙 tusharbudhwani

Education

University of Massachusetts Amherst   **May 2025**
Master of Science in Computer Science   *GPA: 3.95/4.0*

University of Mumbai   **May 2023**
Bachelor of Engineering in Computer Engineering   *GPA: 3.8/4.0*

Experience

Full Stack Development Intern   **Aug 2021 − Jan 2022**
Infovue Solutions Inc.

- Integrated RESTful APIs with external payroll services and benefits providers as part of an HR automation project, significantly improving data synchronization and reducing manual administrative tasks.
- Led development of a MERN based internal employee portal to create a dynamic dashboard for HR and payroll data visualization.
- Assisted in the migration of a legacy monolithic system to a containerized microservices architecture using Docker and Kubernetes, ensuring scalability for 2x projected traffic growth.
- Implemented horizontal scaling via AWS ECS by configuring auto-scaling policies and optimizing load balancing strategies, enabling the platform to efficiently handle up to 1500 concurrent users with minimal latency and high availability.
- Architected an advanced permission and role-based access control (RBAC) module, ensuring secure handling of sensitive employee data and maintaining regulatory compliance.
- Lowered cloud infrastructure costs by 20% through resource utilization analysis, right-sizing EC2 instances, and configuring auto-scaling policies, reducing wasteful AWS spending.

Projects

Generative 3D Reconstruction from Single Image Analysis | *Python, Deep Learning, PyTorch*   **Apr 2024**

- Crafted a 3D reconstruction pipeline that generates high-fidelity 3D models from 2D images using depth estimation and OpenAI's CLIP (Contrastive Language-Image Pre-training) for semantic consistency.
- Fine-tuned the model by freezing encoder layers and optimizing decoder layers, significantly improving visual quality of the 3D reconstructions with efficient resource utilization.
- Enhanced texture quality using multi-resolution triplane sampling, boosting performance with no extra computational cost.
- Decreased computation time and enhanced training efficiency by replacing the original L2 loss with a combination of L1 smooth and cosine loss.

Personalizing LLMs based on User Profile | *Python, LLM, NLP, Deep Learning*   **Dec 2023**

- Fine-tuned Google's FLAN T5-base model using user profile data and devised a pipeline to generate personalized prompts.
- Formulated a query generation function using Lexical Augmentation, elevating accuracy by 44.7% with a 120% F1-score increase.
- Optimized retrieval with a top-k article extraction method using BM25 retriever.

ML-Based Web Platform for Early Detection of Fatal Diseases | *Python, Scikit-learn*   **Feb 2023**

- Developed and evaluated multiple ML models (SVM, Random Forest, XGBoost, AdaBoost), using hyperparameter tuning and k-fold cross-validation to identify the best-performing model for each disease.
- Implemented preprocessing techniques such as feature engineering, SMOTE, and standardization, improving robustness and boosting prediction accuracy of the models by up to 4%.
- Assembled a Stacking Ensemble model combining Logistic Regression, KNN, and Decision Trees, attaining 91.3% accuracy for heart disease detection, outperforming individual models.

Research Patent: Enhancement of Advanced Encryption Standard Algorithm to secure IoT devices   **Aug 2022**

- Indian Patent Application No. 202221045319 A, The Patent Office Journal No. 33/2022, Date of filing: Aug 8, 2022.
- Proposed a faster alternative to the AES algorithm for lower-powered IoT devices and real-time secure communications.

Enhancing Steering Accuracy in Self-Driving Cars Using Deep Learning | *Python, Scikit-learn, Keras*   **Feb 2022**

- Preprocessed 10,000+ images and addressed dataset bias by eliminating 30% of 0-degree steering angles, improving training efficiency by 15% and boosting performance on curves and complex road structures by 20%.
- Devised a custom CNN with 5 convolutional, 4 dropout, and 4 dense layers, achieving training loss of 0.0343 and validation loss of 0.0275, enabling accurate steering predictions and improved generalization.
- Minimized overfitting by applying 4 dropout layers in the CNN, reducing validation error by 25% and enhancing generalization.

Technical Skills

Programming Languages & others: Python, Java, C, C++, SQL, JavaScript, R, Git, GitHub

Python Libraries: NumPy, Pandas, Scikit-learn, NLTK, Matplotlib, TensorFlow, Keras, PyTorch, Seaborn

Databases & Visualization Tools: PostgreSQL, MySQL, Snowflake, Redshift, MongoDB, PowerBI, Tableau, Looker

Full Stack Development: React.js, Node.js, HTML/CSS, AJAX, Bootstrap, JQuery, PHP, Laravel, Django, Flask

Cloud Platforms & DevOps: AWS (SageMaker, EC2, S3, Lambda, RDS, EKS), GCP (BigQuery, Vertex AI, Dataflow, Cloud Functions), Docker, Kubernetes