Tushar Awadhesh Singh

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Education

University of Maryland College Park *2024-Current*
Masters in Machine Learning

Vidyalankar Institute of Technology, Mumbai, India *2017-2021*
Bachelor of Engineering in Electronics Engineering; ***CGPA: 7.84***

Skills

- **Languages**: Python, C++, Java, Scala, R
- **Technologies**: Flask, Spring Boot, SQL, MongoDB, GraphQL, PySpark, Elasticsearch
- **Libraries**: TensorFlow, Pandas, scikit-learn, JAX, PyTorch, PyYAML
- **Tools & Platforms**: Git, Jenkins, Airflow, ROS, GCP, AWS, Docker, Postman, RASA, Heroku, Streamlit, Hadoop

Professional Experience

Tata Consultancy Services Ltd Mumbai, India
ML Engineer/Researcher *Jun 2021 - Aug 2024*

- Achieved 0.97 precision in table detection and 0.94 in table extraction, surpassing our state-of-the-art model TableNet. Effectively addressed both bordered and borderless table challenges on the Marmot dataset. The work is currently under review and was delivered as part of the TCS Wisdom AI model.
- Cheque Signature Verification: Designed a CTS system, reducing EER to 2.4% and manual intervention by 40%, collaborating with researchers at TCS Paceport CMU using CNNs and image enhancement.
- Floor Plan Analysis: Automated area detection using Masked Fast R-CNN and Vision Transformers, reducing delivery time by 75%. Converted 2D plans into 3D visualizations with AtlasNet and Pix2Mesh.
- Led the Tech FM chapter at TCS with 30,000+ members, mentoring interns and executives on AI/ML.
- Created and maintained CI/CD pipelines using Jenkins,Airflow automating build, test, and deployment processes for reliable software releases. Led technical troubleshooting and performance tuning, enhancing system scalability and performance of the Pipeline to manage increasing transaction volumes efficiently.

Tata Proengage Mumbai, India
AI Developer *Jul 2023 - Aug 2024*

- Worked on India's first multilingual and multimodal government scheme recommendation bot.
- Developed a multilingual voice-enabled solution using Whisper and modified Wav2Vec for accurate ASR across multiple languages.Utilized mBERT and XLM-RoBERTa for NLU to interpret user queries, focusing on government scheme recommendations.
- Leveraged GPT-4 Multilingual and mT5 for personalized, context-aware recommendations in native languages and mplemented Tacotron 2 and FastSpeech 2 for natural, multi-language TTS outputs.
- Optimized Wav2Vec 2.0 and XLM-RoBERTa to improve multilingual performance and speech recognition accuracy.Explored DQN and Policy Gradient Methods to build a dynamic recommendation engine that adapted to user feedback.
- Enhanced the solution with SpeechT5 for seamless handling of spoken and written inputs.
- Taught NGO women workforce various AI tools to assist in their daily chores.

MedTourEasy Ltd Noida, India
Data Analyst Intern *Aug 2020 - OCT 2020*

- Developed and deployed a machine learning model using advanced classification algorithms, including Random Forests and Gradient Boosting Machines (GBM), resulting in a 25% increase in donor turnout and enhanced campaign effectiveness.
- Engineered and integrated a scalable analytics dashboard with Tableau for dynamic and interactive data visualization, coupled with MongoDB for efficient and scalable data management, enabling detailed analysis of medical facility performance metrics across multiple regions.

Research and Projects

DC Generator | TCS Rapid Labs (Tech: OpenCV, PyTesseract, PyTorch, SQL, Airflow, Jenkins, AWS, Python, Git)
Researcher (Guide: Dr. Sunil Kumar) *2023*

Developing a Framework to Convert Hand-Drawn POC Sketches into Deployable Websites

- Utilized YOLOv7 for precise object detection and image segmentation, combined with K-Nearest Neighbors (KNN) for feature classification, to extract and align design elements from hand-drawn sketches.
- Developed an automated pipeline to convert design elements into standards-compliant HTML, CSS, and JavaScript, applying Pix2Pix and Semantic Segmentation for improved design fidelity.
- Integrated motion capture and procedural animation for responsive web elements, used Reinforcement Learning (RL) for layout optimization, and employed Neural Style Transfer for blending hand-drawn styles with modern aesthetics.
- Created reusable Web Components with CSS Animations and Transitions, and implemented an AI-driven recommendation engine for diverse design options, supported by Generative Adversarial Networks (GANs) for interactive prototyping.
- Applied user testing analytics and A/B Testing to continuously validate and refine designs, ensuring an optimal user experience and performance.

Calvision (Tech: Python, TensorFlow, TFLite, SQL, AWS, Git, Java, Android Studio)
Developer *2022*

Calorie Prediction System Using Advanced Computer Vision Techniques
https://www.linkedin.com/feed/update/urn:li:activity:6731645057734082560/

- Enabled instant calorie predictions by capturing images or videos of meals, eliminating manual data entry and focusing on a curated selection of foods.
- Combined DepthNet and YOLOv4 for volume estimation by generating depth maps from single images and integrating bounding box data, with MonoDepth2 for accurate depth estimation from various angles.
- Utilized NeRF and DPT for 3D reconstruction of food models from video sequences, improving volume estimation by analyzing multiple viewpoints.
- Developed weight prediction models using Support Vector Regression (SVR) and Neural Networks, extracting visual features for accurate weight estimation, complemented by advanced segmentation with DeepLabV3+ and Mask R-CNN.
- Optimized the solution for mobile devices with TinyML and TensorFlow Lite, employing quantization and pruning for real-time performance, and utilized Edge TPU and NPU acceleration for enhanced inference speed.
- Created a mobile-first system for on-device inference, providing users with instant calorie predictions without cloud dependency.

Mentor Recommendation Web App Using ML (Tech:Java,SpringBoot,SQL,Jenkins,AWS,Python,Git,Tensorflow)
Undergraduate Thesis (Guide: Dr.Sheetal patil) *2021*

- Implemented a T5 model (Text-To-Text Transfer Transformer) using the RASA framework to create an intelligent bot for initial mentorship and QA support on government policies.
- Leveraged T5's text generation capabilities to provide accurate, contextually relevant responses to user inquiries.
- Enhanced mentor recommendations by adapting Neural Matrix Factorization (NeuralsMF) and incorporating DropoutNet, achieving a 44% improvement in top-k prediction accuracy.
- Adjusted matrix factorization algorithms and applied dropout regularization to capture user preferences better and address overfitting, improving recommendation diversity and relevance.
- Developed a hybrid recommendation engine that processes user profiles and preferences for personalized mentor suggestions, enhancing the mentoring process effectiveness.
- Designed the bot to handle a broad range of topics, providing initial guidance on government policies acting as mentor and answering specific queries with contextually appropriate responses using advanced natural language understanding.

Awards & Achievements

- Tata Consultancy Services: Xcelerate Warrior Award for mentoring associates in upskilling. *2023*
- Tata Proengage: Service Award for contributions to NGOs. *2023*
- Tata Consultancy Services: On Spot Award for Virtuoso Delivery. *2022*
- Tata Consultancy Services: Fresco Miles Award for being among the top 1% in in-house skills competition among 200000 participants. *2022*
- Smart India Hackathon: Finalist. *2020*

Extra Curricular Activities

- Tata MyPurpose (Corporate Social Wing): Organized beach cleaning drives and upskilling programs for the underprivileged; organized TCS InQuizitive 2023 (India's largest inter-school IT quiz competition).
- NSS Volunteer: Conducted blood donation and medical camps; State-level badminton player.