Mouhamad Ali Elamine

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Experience

Applied Research Associates Jan 2024 – Present
Deep Learning & Computer Vision Engineer *Raleigh, NC*

- Developed and deployed deep learning models (U-Net, multi-task nets) for satellite-based segmentation and building height estimation, increasing IoU to 95% and minimizing RMSE in elevation maps.
- Automated annotation pipelines using SAM and multi-view projection, reducing manual labeling time by 80%.
- Engineered a tree segmentation model with automated multi-view annotation and NDVI-based clustering, improving DSM point-cloud accuracy for urban planning use cases.
- Boosted segmentation performance in weather forecasting by refining domain-specific geospatial inputs, increasing model IoU from 82% to 93%.
- Integrated models into scalable Flask microservices with Docker and Kubernetes, enabling deployment within geospatial analytics pipelines.
- Optimized CI/CD pipelines via GitLab and Argo, reducing test deployment times by 20% and improving modularity.
- Authored white papers and proposal content for funding opportunities and collaborated cross-functionally with ML engineers to explore latest models and tuning technologies.

Projects

Motion Prediction for Autonomous Vehicles | *TensorFlow, PyTorch*

- Enhanced the Multipath++ model for Waymo motion prediction using Transformer layers.
- Benchmarked the model's trajectory prediction accuracy and robustness against baselines.

Geo-Diverse Language Models Evaluation | *NLP, LLMs, HuggingFace*

- Evaluated common sense reasoning of pre-trained vision-language models on diverse cultural datasets.
- Proposed mitigation strategies for geographic and cultural bias in multimodal transformers.

Weather4Cast Satellite Forecasting | *OpenCV, TensorBoard*

- Built a deep learning model for precipitation forecasting using temporal satellite imagery.
- Achieved 0.81 Precision and 0.64 F1 using axial attention layers to model time dependencies.

OpenMonkey Primate Pose Estimation | *PyTorch, DeepLabCut*

- Implemented 2D landmark detection with pseudo-validation using convolutional pose machines.
- Reduced MPJPE to 0.129 for improved primate behavioral analysis.

Technical Skills

Programming Languages & Scripting: Python, C++, JavaScript, Shell Scripting
Deep Learning Frameworks: PyTorch, TensorFlow, Scikit-Learn, Keras
Specialization Areas: Computer Vision, Natural Language Processing, LLMs
Data Science & Machine Learning: Pandas, OpenCV, NumPy, HuggingFace, TensorBoard
DevOps & MLOps: Git, GitLab, Flask, Docker, Argo, Kubernetes
Tools & Environments: Remote Debugging, Linux (Bash), WSL
Distributed Systems & Big Data: PySpark, AWS S3

Education

University of Minnesota Twin-Cities 2023
Master's of Science in Computer Science. Specialization in ML and Computer Vision *Minneapolis, MN*

American University of Beirut 2022
Bachelor of Engineering in Computer Engineering. Specialization in Communication *Beirut, Lebanon*