Simone Sorrenti

AI & Robotics Engineer

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Portfolio

SUMMARY

Results-driven AI & Robotics Engineer with a Bachelor's in Informatics and a Master's in Machine Learning, currently leading projects in AI and robotics at TXT E-TECH, focusing on autonomous systems and anomaly detection in aerospace and defense. With a background in full-stack development, I thrive in interdisciplinary collaboration and delivering customized solutions. Passionate about using technology, I am dedicated to continuous learning and growth.

EXPERIENCE

R&D AI & Robotics Engineer, TXT E-Tech

06/2024 - Present

- Optimized and deployed computer vision models for object detection and OCR, enabling a robotic arm (UR5e) to autonomously conduct validation tests on cockpit cabins. Developed an audio matching algorithm using audio preprocessing techniques, MFCC features, and DTW to enhance validation capabilities for the robotic system Automated Robotics for Testing Optimization.
- Developing Generative Adversarial Networks (GANs) and autoencoders to detect anomalies in solar panel cells mounted on satellites.
- Creating a dataset for object detection from aerial footage for an upcoming Kaggle competition.

Computer Vision Research Intern, Polytechnic of Milan & PERIVALLON

02/2023 – 04/2024

- Developed deep learning models (CNN and ViT) to detect illegal waste disposal across Europe as part of the EU-funded PERIVALLON project, using satellite images from the AerialWaste dataset provided by ARPA Lombardia.
- Expanded the dataset using data augmentation techniques and created a pipeline to standardize images from different sources.
- Applied weakly supervised learning techniques (Hierarchical Heatmap and Multiple Instance Learning) to segment areas of interest.

IT Consultant & Application Development Analyst, Accenture & Blue Reply

01/2020 - 08/2021

- Developed interactive web applications using both frontend and backend technologies, while working closely with cross-functional teams to identify client needs and deliver tailored solutions in the insurance and banking sectors.

EDUCATION

M.Sc. in Machine Learning

Polytechnic of Milan

09/2020 - 04/2024 Milan, Italy

GPA **3.74** / 4.0

- Thesis: PERIVALLON (European Project) - Detection of Illegal Landfills using Deep Learning: A Weakly Supervised Approach

B.Sc. in Informatics

University of Bari Aldo Moro

09/2014 - 10/2018 Bari, Italy

GPA **3.79** / 4.0

- Thesis: Solar radiation prediction through Machine Learning algorithms

PROJECTS

- **Detection of Illegal Landfills:** Conducted a thesis for the EU-funded PERIVALLON project, focusing on detecting illegal waste disposal through satellite imagery. Utilized CNNs and Vision Transformers, along with weakly supervised segmentation techniques. Addressed challenges like data scarcity and class imbalance, improving model accuracy from 80% to 90%. [Thesis] [GitHub]
- **Contrastive Language-Image Pre-Training:** Explored CLIP models for image captioning, zero-shot classification, image retrieval and clustering tasks across diverse datasets, including medical and fashion data. [Report] [GitHub]
- **Mathematical Models and Methods for Image Processing**: Explored advanced image processing techniques, including sparse coding and robust fitting methods, through mini-projects on denoising, inpainting, and anomaly detection. [GitHub]
- **Question Answering System:** Implemented a question answering system with BERT, GPT-2, and T5 on the SQuAD dataset, focusing on answer extraction and response generation. [GitHub]
- **Autonomous Mapping and Navigation:** Created and visualized environmental maps using 2D and 3D laser data. Implemented waypoint-based navigation with autonomous movement and localization, utilizing Move Base and AMCL for effective pathfinding and obstacle avoidance. [GitHub]
- **Applying Vision Transformers for Brain Tumor Classification:** Implemented the Vision Transformer from scratch for classifying tumors in MRI images. Developed a machine learning pipeline that includes data augmentation, early stopping, and model checkpointing. [GitHub]
- **Recommender System:** Developed a recommender system for TV shows utilizing Content-Based Filtering, Collaborative Filtering, Context-Aware, Graph-Based and Hybrid approaches. Focused on user interaction data and show features. [Kaggle]
- **Prediction of Solar Radiation Through Machine Learning Algorithms:** Developed a system for predicting solar radiation, utilizing machine learning algorithms such as Support Vector Machines (SVM), Multi-Layer Perceptron (MLP), and Long Short-Term Memory (LSTM) networks. Applied feature selection techniques to identify key meteorological parameters for accurate forecasting. [Thesis]

SKILLS

Technical Skills: Python, Java, PyTorch, TensorFlow, CUDA, ROS2, Linux, OpenCV, HugginFace, Git, MySQL, TypeScript, PHP, HTML, CSS
Language Skills: English (B2), Italian (Native)
Soft Skills: Continuous Learner, Collaborative Team Player, Problem Solver, Adaptable, Critical Thinker, Time Management