

# Introduction

Capstone Portfolio - AI Foundations (ITAI 2277)

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Summary:

I am a student of AI and machine learning and have practical experience in the field of neural network creation, the implementation of NLP, the design of diffusion models, and the study of AI in practice. I have combined technical and critical aspects of AI ethics, industry effect, and new technologies in my work.

# Course Highlights

In the project 1, the authors introduce the problem of CNN-based image classification.  
Applied convolutional neural networks to CIFAR-10 and others.

Did feature extraction, feature pooling and model tuning.

Gathered practical workflow training and improvement of deep learning models.

Project 2: NLP Pipeline on Climate Tweets.

Pretreating text (tokenization, stop words, stemming, POS tagging, vectorization)

Discovered the effect of text cleaning on the accuracy of the ML model.

Constructed base of sentiment analysis and topic modeling.

# Additional Learning and Technical Skills

Diffusion Model Implementation (C4.5)

A U-Net architecture was developed.

Applied noising/denoising processes.

CLIP was used to evaluate generated images.

Other Key Work:

Antagonistic AI studies (prompt injection, data poisoning, defense)

AI fraud detection, manufacturing, government case studies.

Predictive AI and AGI technologies analysis through ethics.

Tools & Technologies:

Python, PyTorch, TensorFlow Playground

spaCy, NLTK, sklearn

Github, Jupyter Notebooks

Principles of diffusion modeling.

# Real Life Applications

How I Can Apply These Skills:

Machine Learning Modeling Image recognition, text classification, predictive analytics.

Data Cleaning & Preprocessing: Constructing quality datasets to ML pipelines.

AI Research and Evaluation: Ethics, model robustness, safety.

Industry Use-Cases:

Healthcare: risk prediction and diagnostics.

Finance: anomaly analysis and fraud detection.

Retail: prediction and personalization of customer behavior.

Government/public sector: AI to automate, provide services and be transparent.

# Wrap-Up

GitHub Repository:

[https://github.com/itsjadesanchez/Pf\\_JadeSanchez\\_ITAI\\_2277/tree/Portfolio](https://github.com/itsjadesanchez/Pf_JadeSanchez_ITAI_2277/tree/Portfolio)

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