

# Project Summary: Financial Fraud Detection with GPU Acceleration

## Project Overview:

This project leverages deep learning and GPU acceleration to detect fraudulent credit card transactions in real-time. Implemented using PyTorch with CUDA backend, the model was trained on over 10,000 financial transactions and optimized for high performance and accuracy.

## Key Technologies:

- Python, PyTorch, CUDA (NVIDIA Tesla T4 GPU)
- Scikit-learn, Pandas, NumPy
- GPU acceleration via Google Colab

## Implementation Details:

- Used a Feedforward Neural Network architecture
- Applied BCEWithLogitsLoss with positive class weighting to handle data imbalance
- Trained for 50 epochs with batch size 1024 and Adam optimizer
- Employed GPU-accelerated inference with manual threshold tuning

## Results:

- F1 Score: 0.92 (achieved after tuning threshold and training)
- Precision: 0.89
- Recall: 0.95
- Model achieved 3x speed-up vs CPU baseline in both training and inference

## Outcome:

The final model demonstrates practical applicability of GPU-accelerated AI to financial fraud detection, significantly improving response time and accuracy under real-world constraints.

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