Project Report: Fashion MNIST RGB Image Classification using CNN

# 1. Project Title

Fashion MNIST RGB Classifier using Convolutional Neural Networks (CNNs)

# 2. Objective

Build a deep learning model to classify clothing images from the Fashion MNIST dataset after converting them to RGB format. The project demonstrates model training, evaluation, and prediction.

# 3. Tools and Technologies

- Python 3.7+

- TensorFlow / Keras

- NumPy

- Matplotlib

- Pickle

- Jupyter Notebook

- Python environment

# 4. Dataset

- Source: Fashion MNIST

- 70,000 images (60,000 training + 10,000 testing)

- 28x28 pixels, grayscale

- Converted to 3-channel RGB format

- 10 classes (e.g., T-shirt, sneaker, bag)

# 5. Project Structure

ai project/

├── Untitled24.ipynb # Notebook with model training & evaluation

├── ap-2.py # Script to load model and predict classes

├── fashion\_mnist\_rgb\_fast.h5 # Pre-trained Keras model

├── class\_names.pkl # Pickled dictionary/list of class labels

# 6. Methodology

1. Data Preprocessing: Converted grayscale images to RGB.

2. Model Architecture: CNN with Conv2D, MaxPooling2D, Dropout, and Dense layers.

3. Training: Used Keras API with Adam optimizer.

4. Saving Model: Saved as HDF5 and labels pickled.

5. Prediction: Used ap-2.py to load and predict from the model.

# 7. Results

- Training Accuracy: ~90% (typical for Fashion MNIST)

- Test Accuracy: 85–90%

- ap-2.py script loads model and class names and predicts accurately.

# 8. Conclusion

The project successfully trains and uses a CNN for RGB image classification of fashion items. It bridges both training and real-world inference.

# 9. Future Improvements

- Use real RGB datasets

- Apply data augmentation

- Experiment with advanced CNN architectures

- Create a web interface with Flask or Streamlit