Assignment: Cats vs Dogs Classifier

Goal

In this assignment, you will build a Convolutional Neural Network (CNN) to decide whether a given image is of a cat or a dog. This project will help you understand the basics of TensorFlow, Keras, and CNNs.

Dataset

You will use a small version of the Cats vs Dogs dataset from Kaggle:
https://www.kaggle.com/datasets/tongpython/cat-and-dog
The dataset has two folders: cats/ → pictures of cats, dogs/ → pictures of dogs. Download the dataset and upload it to Google Colab (or mount Google Drive).

What You Need to Do

1. Import libraries: TensorFlow/Keras, NumPy, Matplotlib.
2. Load and preprocess the dataset: resize images (128x128), normalize pixel values (0–1), split into training (80%) and validation (20%).
3. Build a CNN model: Conv2D → ReLU → MaxPooling → Conv2D → ReLU → MaxPooling → Flatten → Dense → ReLU → Dense → Sigmoid.
4. Compile the model: loss = binary_crossentropy, optimizer = adam, metric = accuracy.
5. Train the model for 10–15 epochs. Plot training & validation accuracy/loss curves.
6. Evaluate the model: print accuracy and test with a few random images.

What to Submit

1. Jupyter/Colab Notebook (.ipynb file): should include code, plots, predictions, and comments.
2. README File (one page, in PDF or Word): include problem statement, dataset details, approach, results, challenges & learnings.

Expected Outcome

1. You will understand the basics of Keras + TensorFlow.
2. Your CNN should achieve around 70–80% accuracy.
3. You will learn how to train, validate, and test a simple CNN.

Do everything in Google Colab (recommended). At the end, download your notebook (.ipynb) and submit along with your README file.