Case Study Rubric: ASL Digit Recognition

Purpose

The goal of this case study is to guide you through building and evaluating a machine learning model that can recognize American Sign Language (ASL) digit signs (0–9) from static images. You will apply a full data science workflow, including data preprocessing, model building, evaluation, and reflection.

Task

Your task is to create a data science report and notebook that demonstrate your process of building a Convolutional Neural Network (CNN) to classify ASL digit images. You will document your decisions, show results, and provide insights into your model's strengths and weaknesses.

Deliverables

• A Jupyter notebook (.ipynb) with well-commented code for loading data, preprocessing, training, and evaluating the model.
• A PDF report (2–3 pages) summarizing:
  - Dataset overview
  - Model architecture and training process
  - Evaluation results (accuracy, confusion matrix, etc.)
  - Reflections on what worked well and what could be improved
• Saved model file (.h5) and any relevant output images (plots, confusion matrix).

Criteria

Your submission will be graded based on the following criteria:

1. **Clarity and Organization (20%)**
  - Is your notebook well-organized and easy to follow?
  - Is your report clear, with logical flow?

2. **Technical Execution (30%)**
  - Did you correctly preprocess the dataset?
  - Is the CNN model appropriately designed and trained?
  - Are code comments and explanations included?

3. **Evaluation and Analysis (30%)**
   - Did you evaluate your model thoroughly (accuracy, confusion matrix, etc.)?
   - Did you provide meaningful analysis of your results?

4. **Reflection and Critical Thinking (20%)**
   - Did you discuss model strengths and limitations?
   - Did you propose reasonable next steps or improvements?

Submission Instructions

Submit your Jupyter notebook, PDF report, model file, and any output images to the GitHub repository provided. Make sure your repo includes a README file explaining how to reproduce your work.