

Problem - Given an image predict the sum of digit in an image

Training.ipynb

A baseline model has been trained for this task. The model's performance was evaluated during training using the Mean Squared Error (MSE) as the loss function and a custom accuracy metric. The model architecture consists of an Input layer, indicating a 2D input with a single channel (greyscale). Two convolutional layers with First Conv2D Layer, 32 filters of size 3x3 with ReLU activation. This layer detects low-level features like edges or textures. Second Conv2D Layer, 64 filters of size 3x3 with ReLU activation, learning more complex patterns from the previous features. Two MaxPooling2D layers with a pool size of 2x2. These layers reduce the spatial dimensions of the feature maps, improving efficiency and preventing overfitting. Two Dropout layers, with rates of 0.25 and 0.5. These layers randomly drop neurons during training to prevent overfitting and promote generalization. And Fully Connected (Dense) Layers with dense Layer 128 units with ReLU activation. Combines features learned by the convolutional layers. And output Layer with a single unit with no activation, providing a continuous value for regression.

The model was compiled with Loss Function that is Mean Squared Error (MSE) and MAE (Mean Absolute Error), for evaluating absolute deviations between the predicted and actual values. Custom Accuracy Metric to evaluate whether the absolute error between the true and predicted values was less than or equal to 5.

The model was trained on the provided training data for 10 epochs with a batch size of 64 and optimizer Adam. The validation data was used to monitor performance on unseen data.

Results: A plot was generated to visualize the loss function's progress over epochs. The training loss (MSE) showed a gradual decrease as the model learned from the data, indicating that the model was effectively minimizing the error. The validation loss was also tracked to observe any potential overfitting, ensuring that the model generalizes well.

The model successfully minimized the MSE over the training epochs, and the custom accuracy metric indicated satisfactory performance.

Inference.ipynb

Model Inference and Evaluation Report

After training, the model was used to make predictions on the training set. We then evaluated the performance using a custom accuracy metric: This metric calculates the proportion of

predictions where the absolute error is within ± 5 of the true value. Mean Absolute Error (MAE) a standard metric for regression tasks, it measures the average absolute error between the predicted and true values.

Results: The custom accuracy metric provided an understanding of how many predictions were within an acceptable error range. MAE: This value indicates the average magnitude of error in the model's predictions. A scatter plot of actual vs. predicted values was generated, with a red dashed line representing a perfect prediction. This visualization helped to assess the model's predictive accuracy.