Logistics Delivery Time Prediction (ridge regression l2 norm)

Training Summary

Model Type	Feedforward Neural Network (Keras Sequential)
Epochs	15
Optimizer	Adam
Loss Function	Mean Squared Error
Regularizer	L2 (Ridge) with factor 0.01
Final Test MAE	7.04 minutes

Prediction Examples

Actual Time (min)	Predicted Time (min)	Absolute Error (min)
20.0	22.43	2.43
40.0	35.77	4.23
51.0	50.99	0.01
41.0	41.47	0.47
61.0	54.23	6.77

Notes on Model and Regularization

• The model is a feedforward neural network trained to predict delivery times.
• L2 regularization (also known as Ridge regression in linear models) is applied to the network weights via the kernel_regularizer parameter.
• L2 regularization helps to reduce overfitting by penalizing large weights, improving model generalization.
• This approach is similar in principle to Ridge regression, but applied here to a deep learning model.

Mean Absolute Error (MAE)

MAE measures the average magnitude of errors in predictions, without considering their direction.
It is calculated as:

$$MAE = (1/n) * \Sigma \, | \, y_i - \hat{y}_i \, |$$

where:
 - y_i is the actual value,

- ŷ_i is the predicted value,
- n is the number of samples.

Conclusion

• The model achieved a test Mean Absolute Error (MAE) of approximately 7.04 minutes, indicating good predictive performance.
• Predictions are close to actual delivery times, suitable for operational use.
• Further feature engineering or additional data may improve accuracy.