

# Wind LSTM + SHAP Report

# Wind Speed Prediction LSTM + SHAP Report

### Model Summary

- \*\*Model Type:\*\* LSTM Encoder-Decoder
- \*\*Encoder Steps (n\_past):\*\* 24
- \*\*Decoder Steps (n\_future):\*\* 7
- \*\*Number of Features (n\_features):\*\* 8
- \*\*Latent Dimension:\*\* 128

### Training Performance

- \*\*Epochs:\*\* 10
- \*\*Final Training Loss:\*\* 0.0245
- \*\*Final Validation Loss:\*\* 0.0204

### Evaluation Metrics (WIND prediction)

- \*\*RMSE per horizon:\*\*
  - Horizon 1: 4.32
  - Horizon 2: 4.60
  - Horizon 3: 4.71
  - Horizon 4: 4.79
  - Horizon 5: 4.73
  - Horizon 6: 4.79
  - Horizon 7: 4.77
- \*\*MAE per horizon:\*\*
  - Horizon 1: 3.43
  - Horizon 2: 3.62
  - Horizon 3: 3.70
  - Horizon 4: 3.76
  - Horizon 5: 3.74
  - Horizon 6: 3.78
  - Horizon 7: 3.77
- \*\*MAPE per horizon:\*\*
  - Horizon 1: 57.60%
  - Horizon 2: 58.85%
  - Horizon 3: 59.01%
  - Horizon 4: 59.88%
  - Horizon 5: 63.14%
  - Horizon 6: 63.02%
  - Horizon 7: 63.64%

### SHAP Feature Importance (for first prediction horizon)

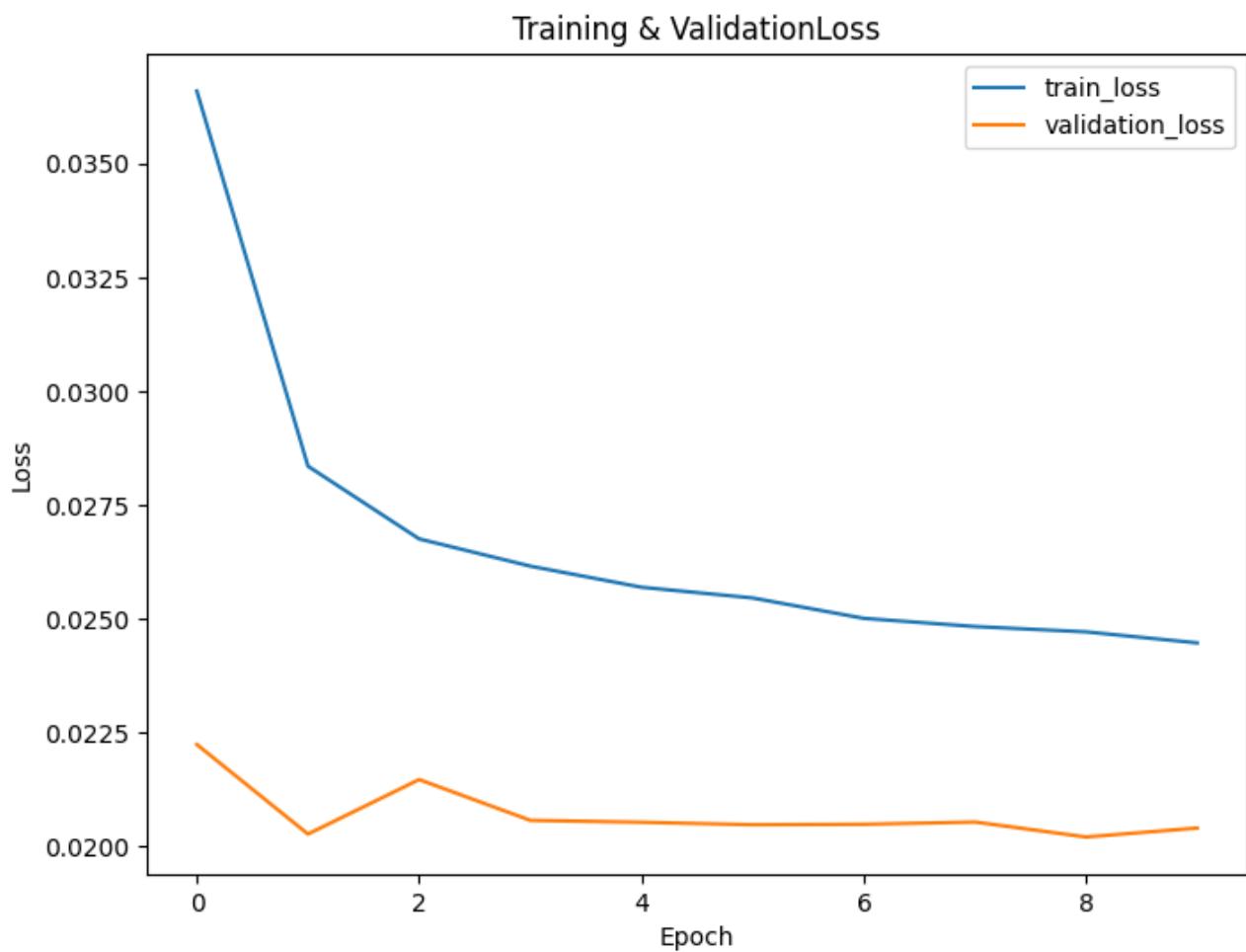
Top features by Mean Absolute SHAP Value (KernelExplainer):

- WIND: 0.0018
- IND: 0.0003
- IND.2: 0.0001

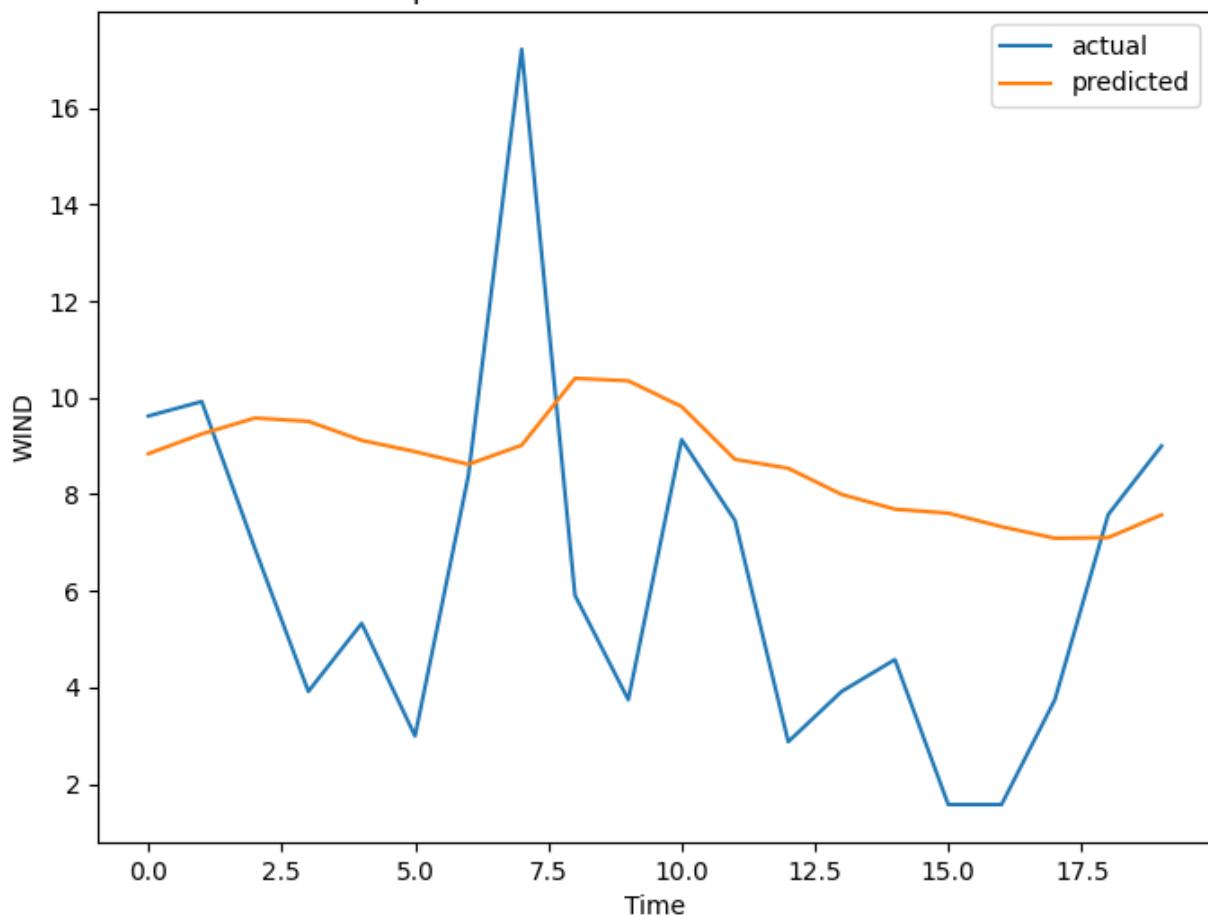
- T.MAX: 0.0001
- T.MIN.G: 0.0001

### ### Visualizations

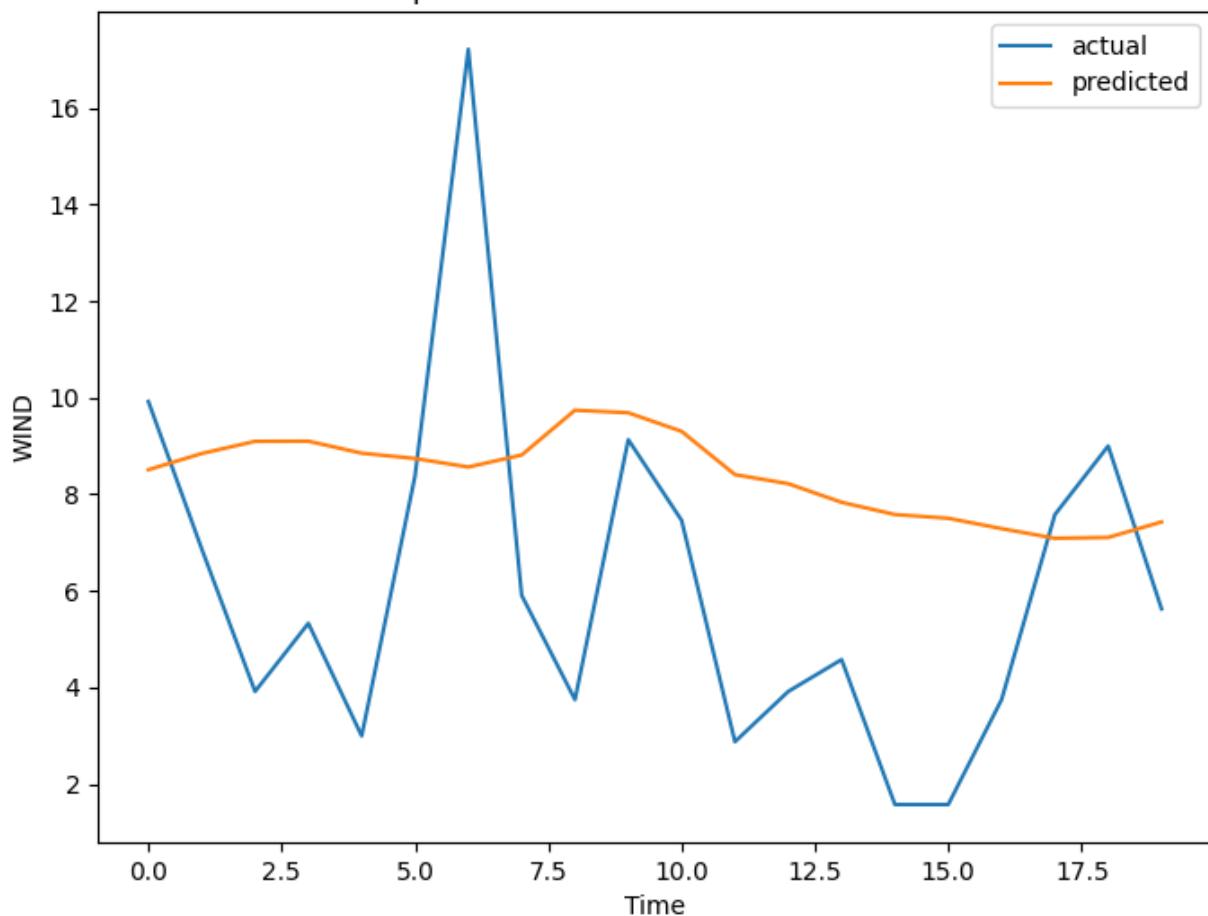
- Training & Validation Loss Plot: `training\_validation\_loss.png`
- Predicted vs Actual for first 3 horizons: `pred\_vs\_actual\_h1.png`, `pred\_vs\_actual\_h2.png`, `pred\_vs\_actual\_h3.png`
- SHAP Feature Importance Plot: `shap\_feature\_importance\_kernel.png`



predicted vs Actual for horizon 1



predicted vs Actual for horizon 2



predicted vs Actual for horizon 3

