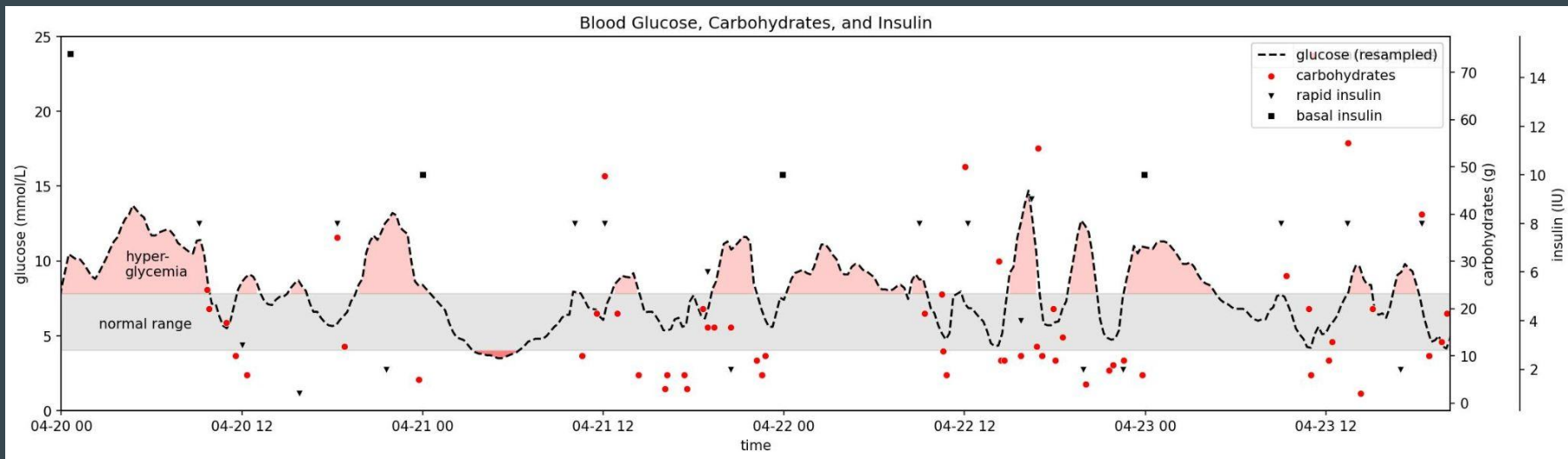


Predicting Blood Glucose

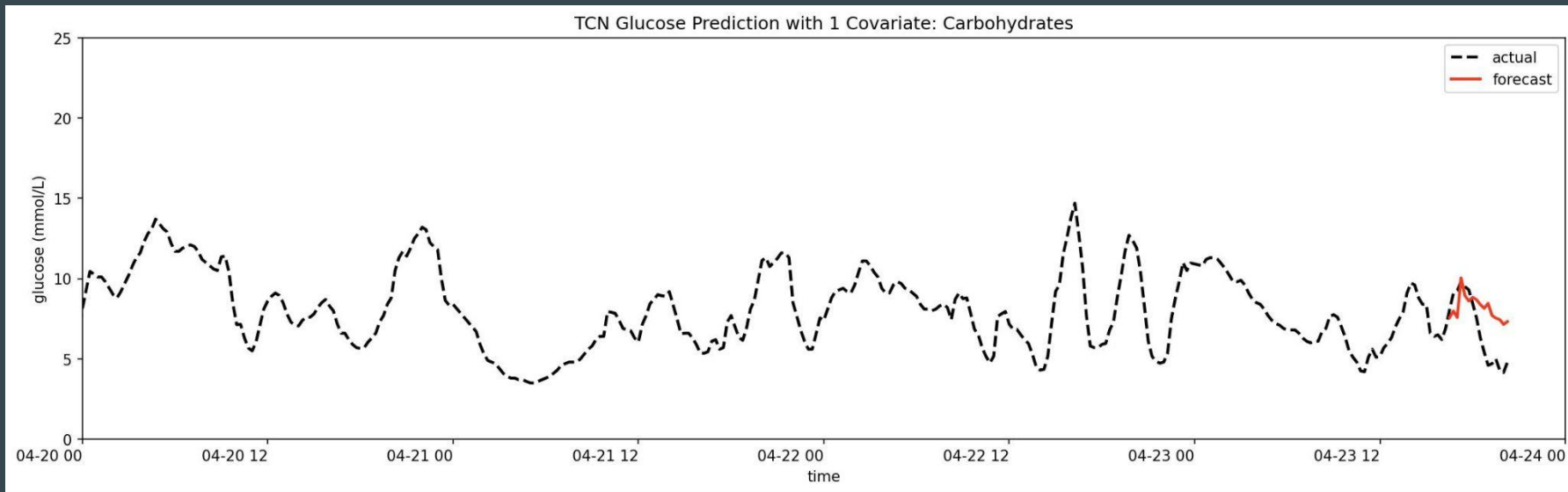
...

Time Series Analysis

Blood glucose out of range requires frequent adjustments ...



... that could be avoided with a **glucose prediction**.



The best model ...

- Model selection based on **mean absolute percentage error** of predicted vs. actual blood glucose

SARIMAX (2, 1, 1)	TCN
34%	31%

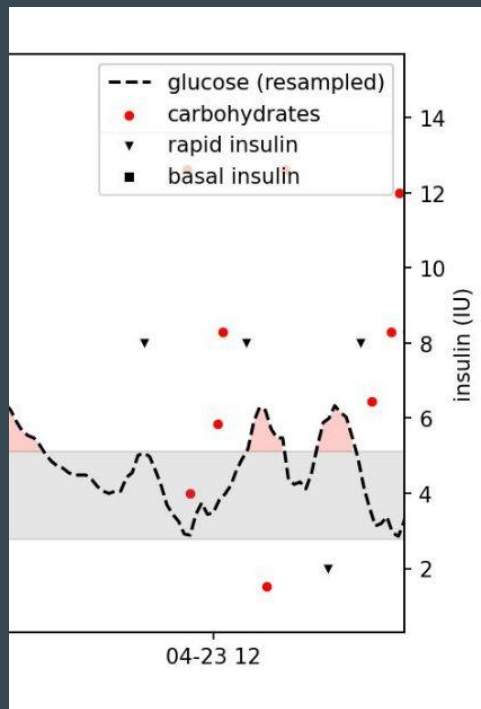
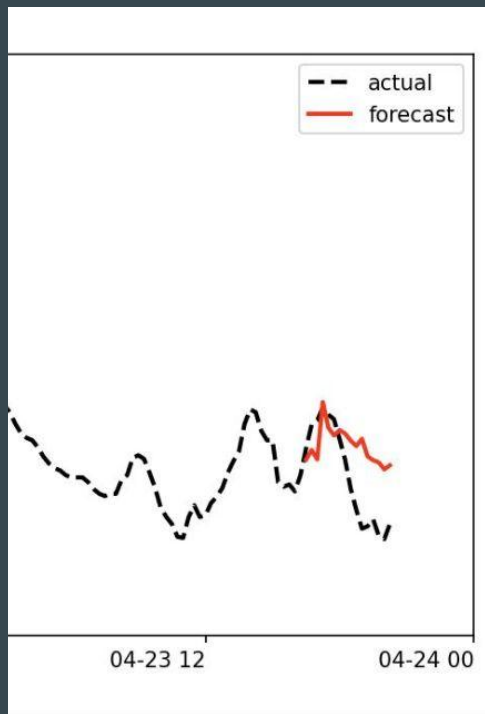
SARIMAX: Seasonal AutoRegressive Integrated Moving Average with eXogenous variables

TCN: Temporal Convolutional Network

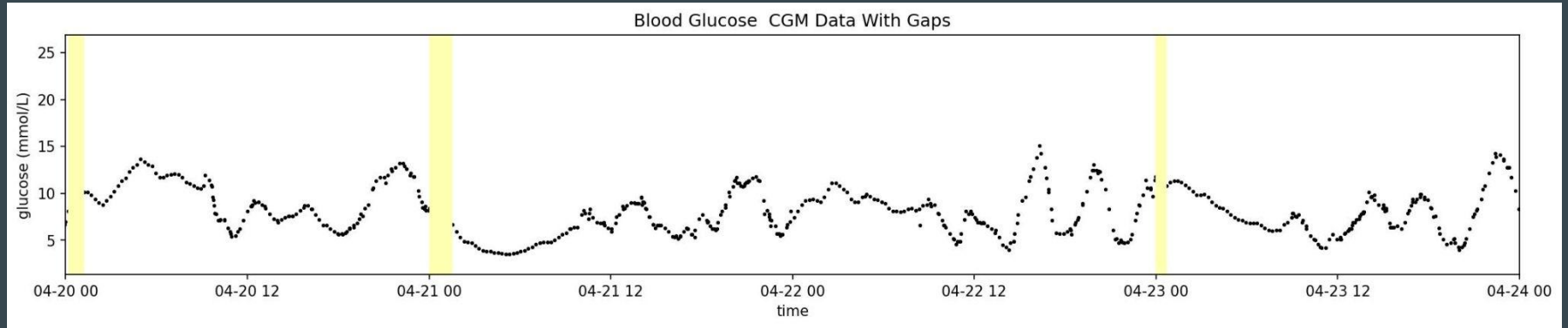
... is not good enough, ...

- A 30% error can make the difference between hyperglycemia vs. hypoglycemia
- The predicted range is too large to determine the exact insulin dose

... but may still be useful for 2 hours of the forecast.



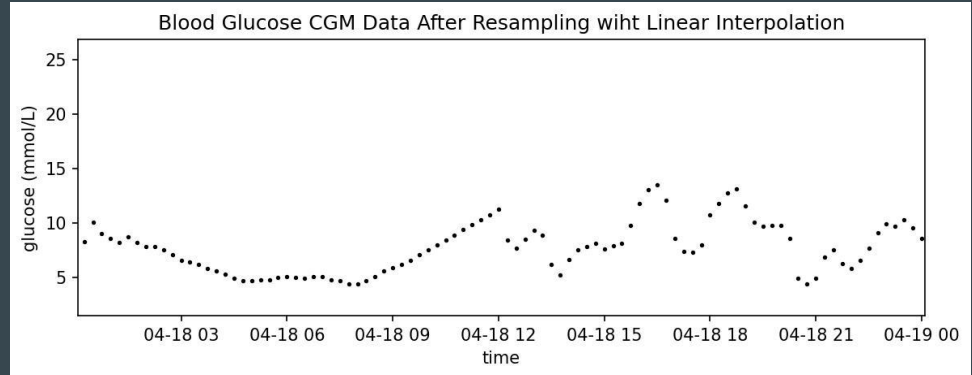
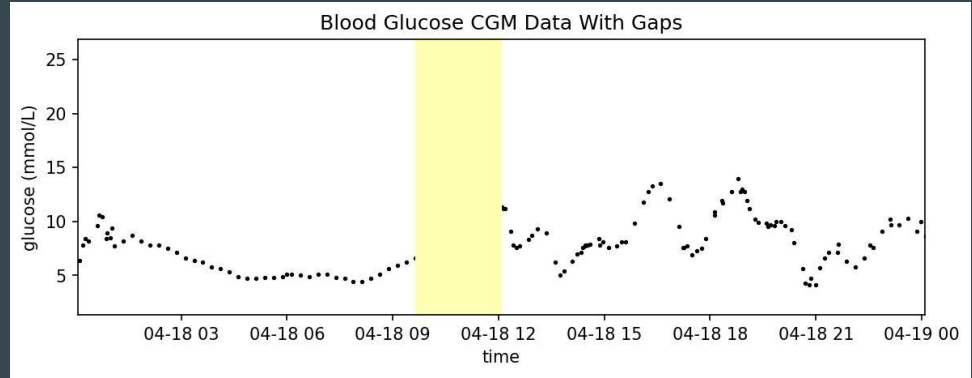
Using CGM data...



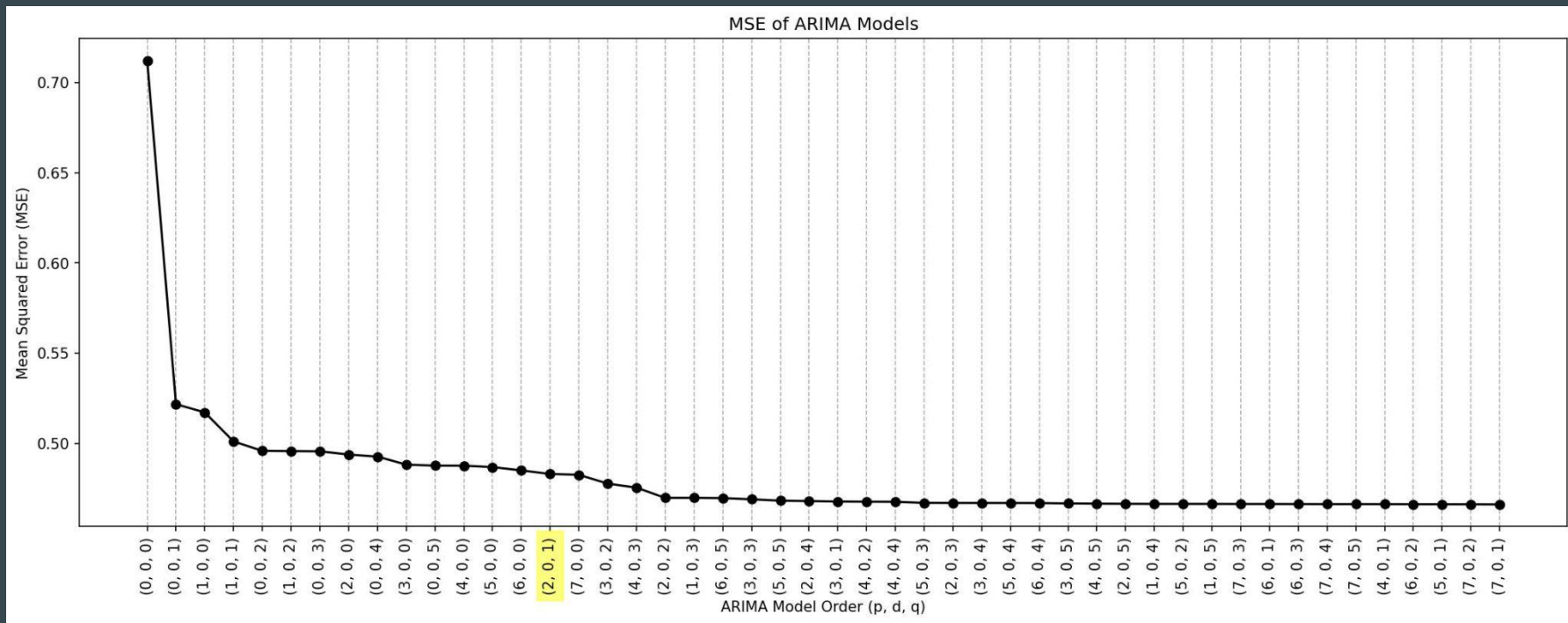
CGM: continuous glucose monitor

... requires connecting the dots.

- Gaps up to 3 hours
- Resampled at 15 minute intervals with linear interpolation

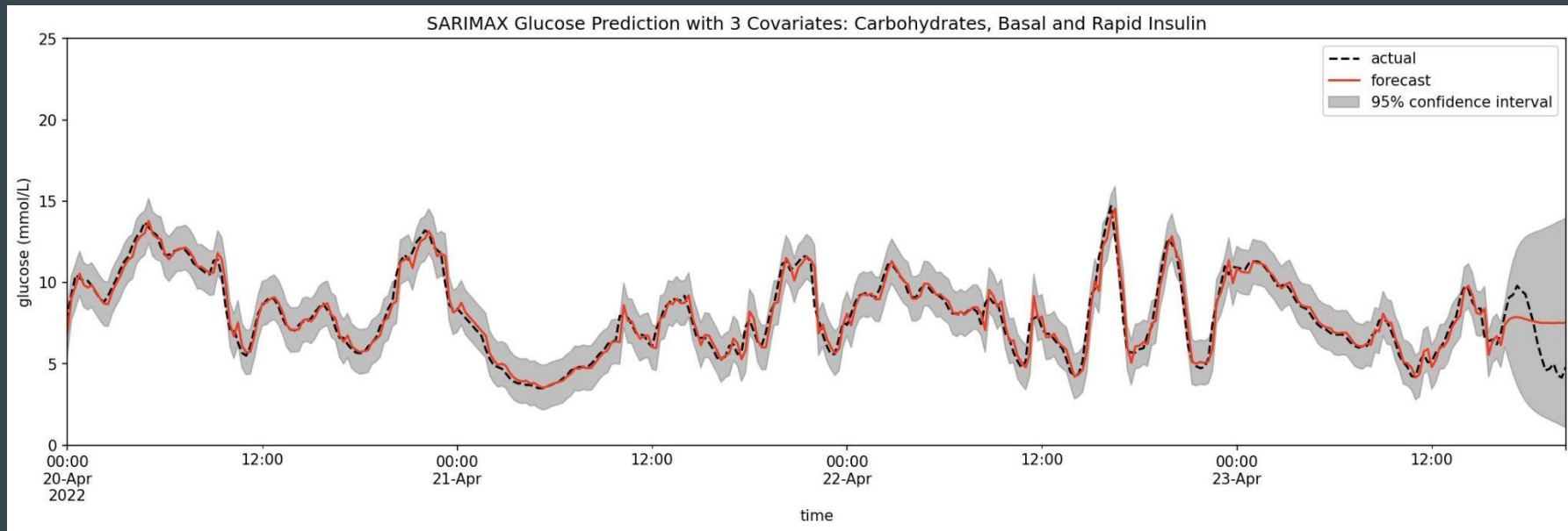


Small ARIMA model order is good enough...

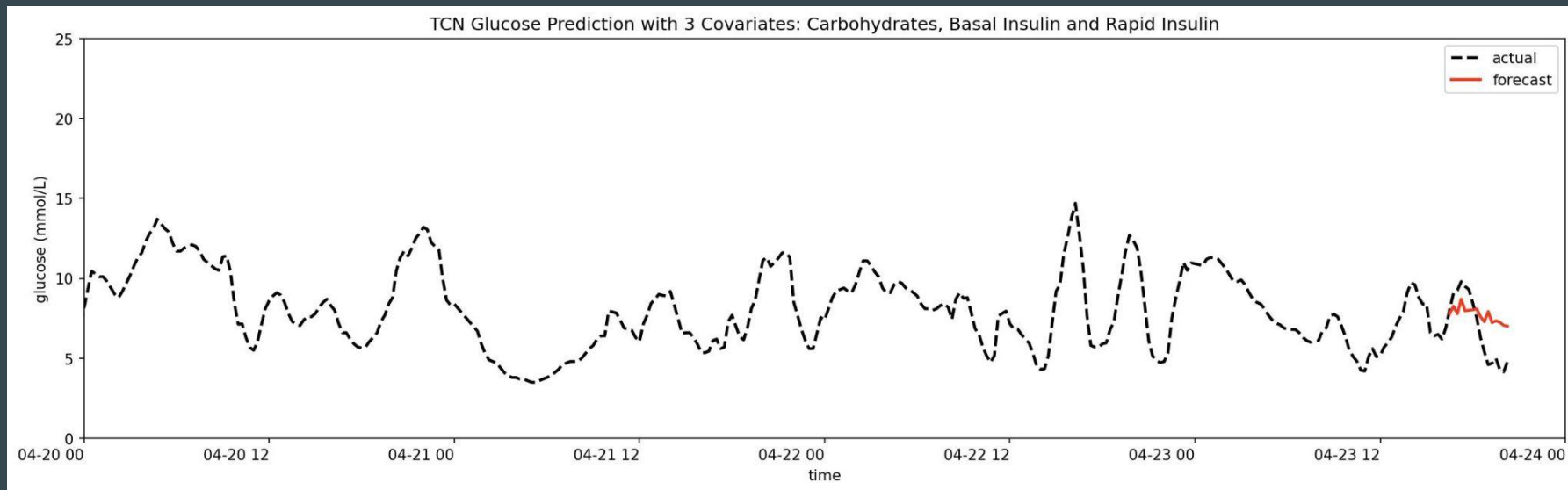


Note: model order for once differenced series

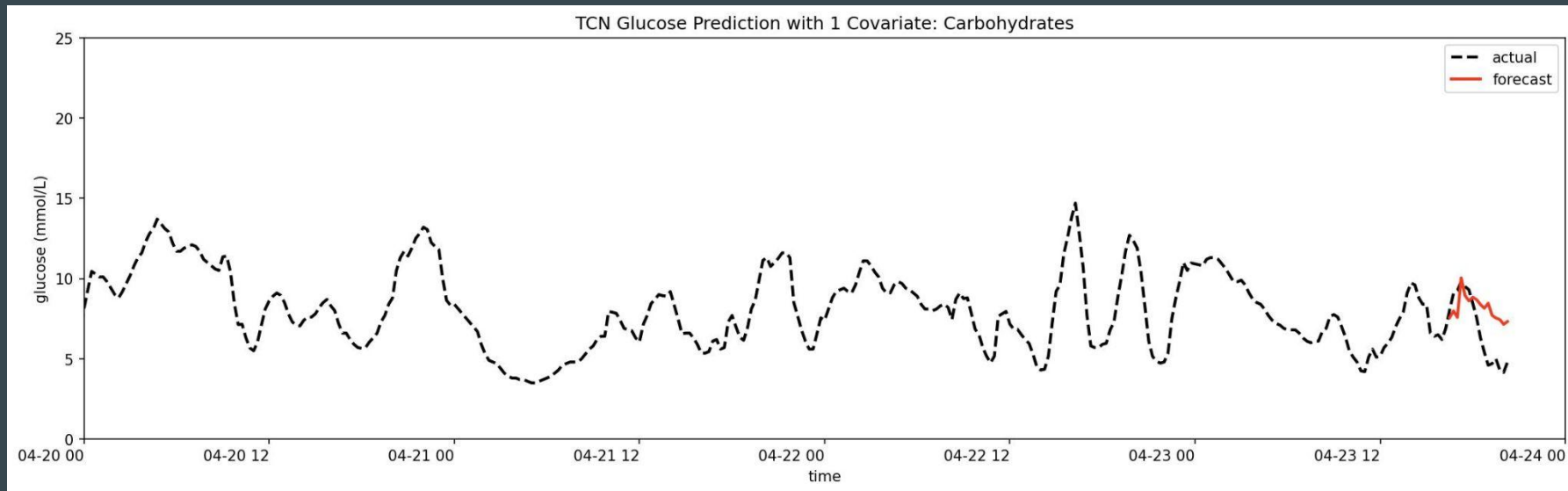
.. and used to fit a SARIMAX (2, 1, 1) model with 3 covariates.



A TCN model with 3 covariates looks similar to SARIMAX....



... after TNC with 1 covariate seemed so promising.



A better model is needed...

- Salvage current models
 - Use smaller forecast horizon
 - Improve tuning
- Try different model
 - Temporal Fusion Transformer (TFT)

...meanwhile, only use the first 2 hours of forecast.