Multi-Input Multi-Output Electric Motor Modeling using Neural Networks

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Table Of Contents

What we discussed in the last meeting?

1. Problem definition
2. Neural networks introduction
3. Early results on public dataset
4. Error in predicting impulse peeks
5. Prediction scaling problem

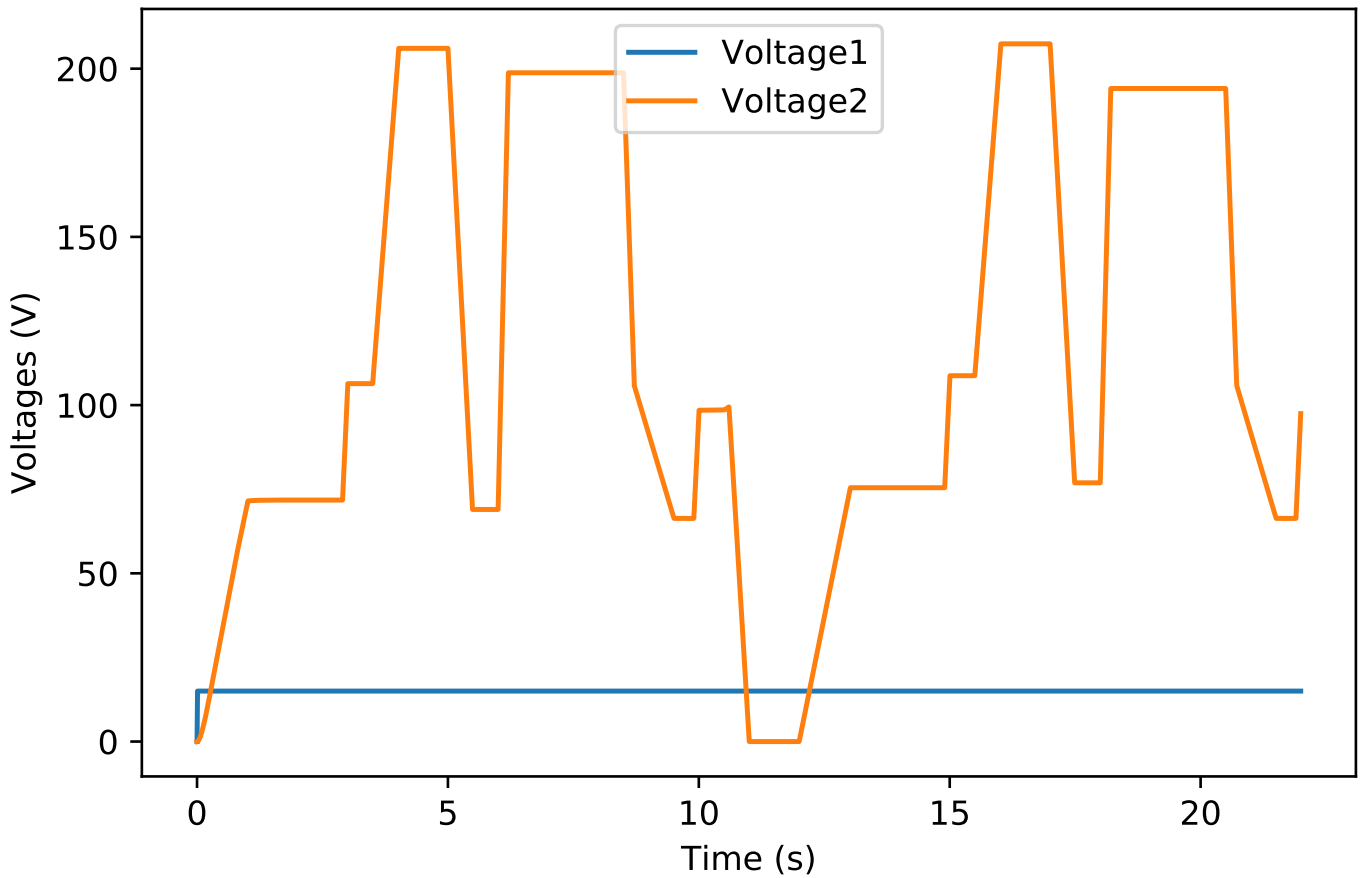
Dataset

Description

1. Single experiment
2. 1200 seconds long
3. Simulink dq-frame model is used

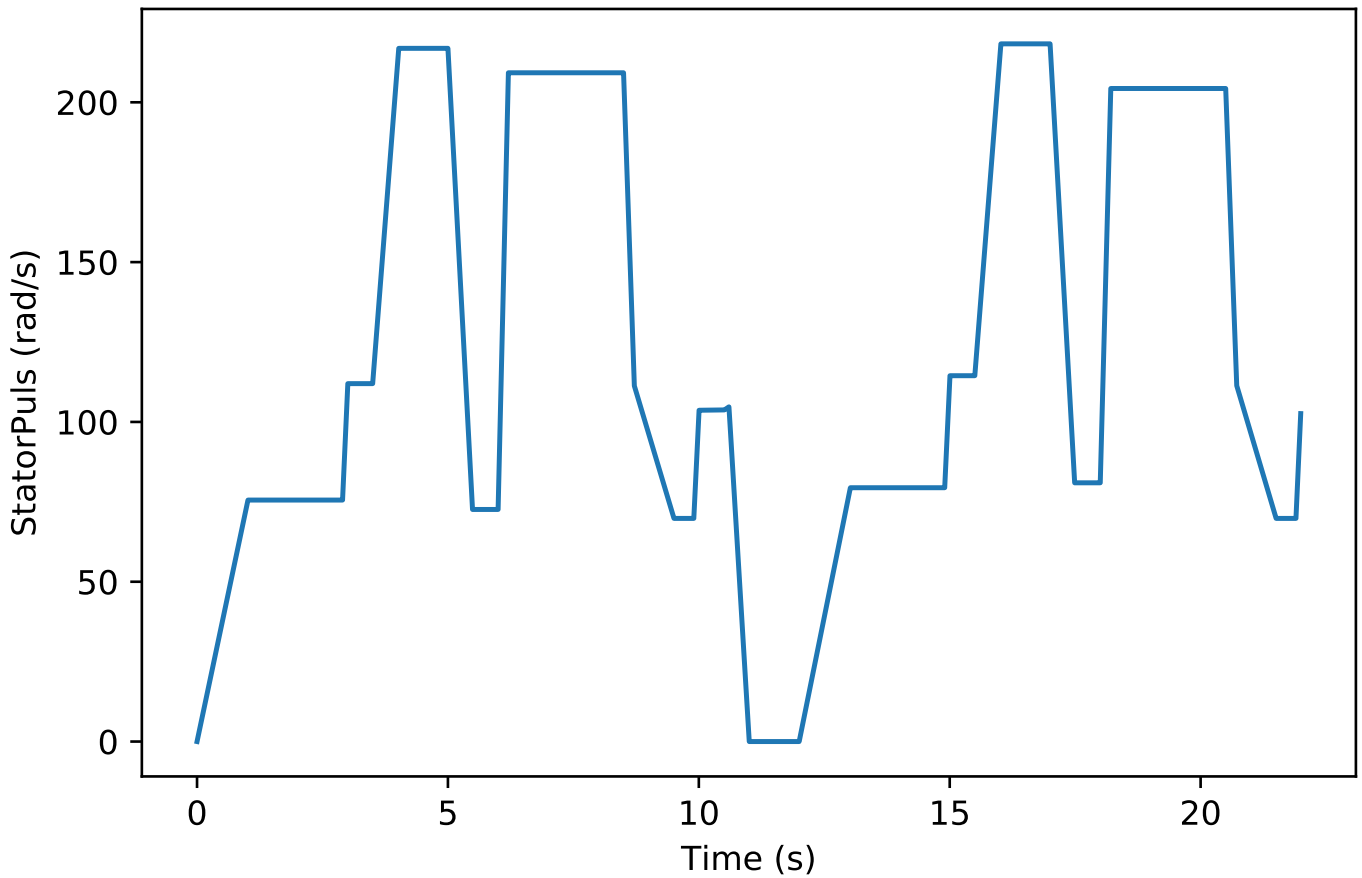
Dataset

Voltages



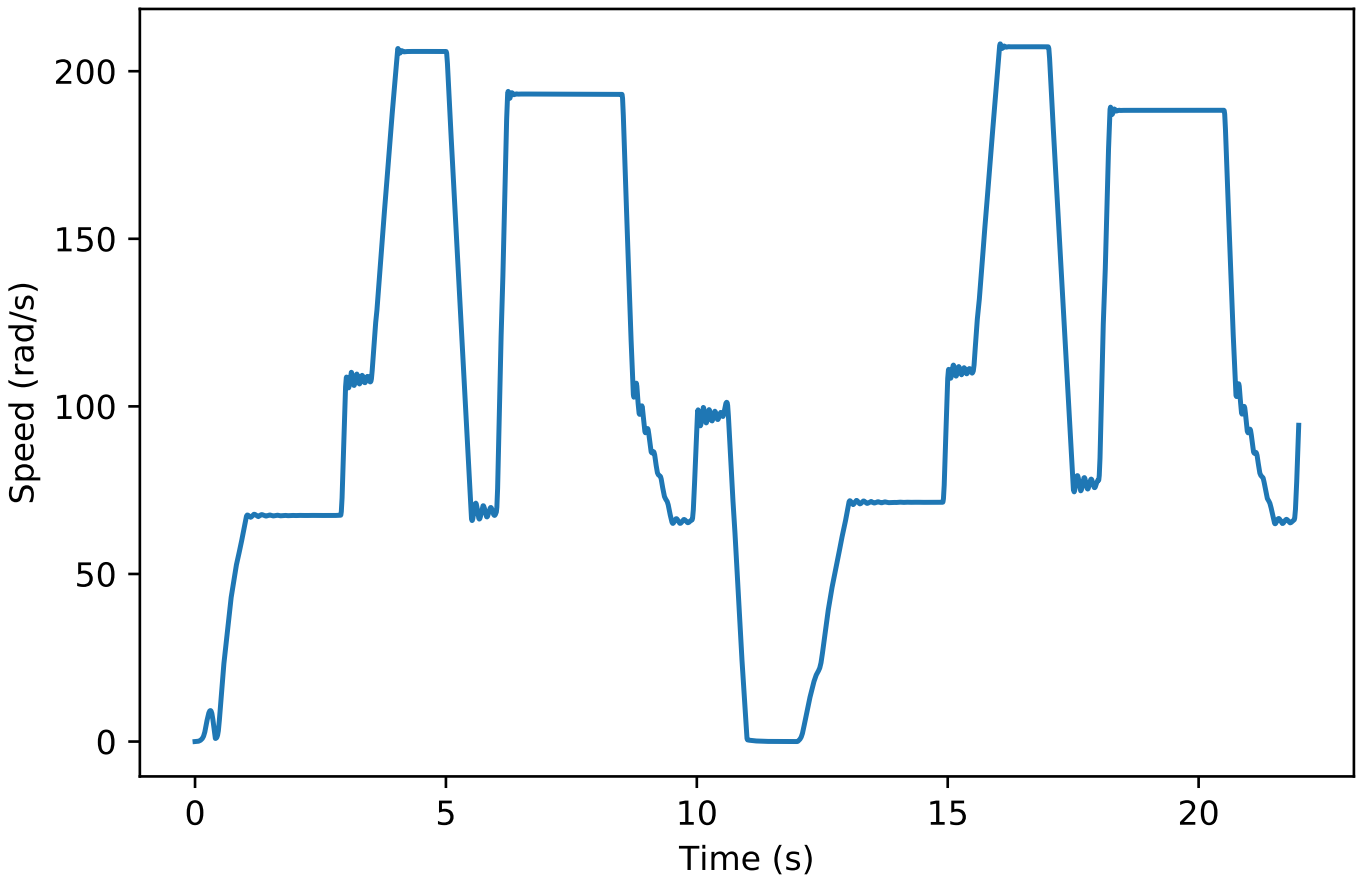
Dataset

Stator Puls



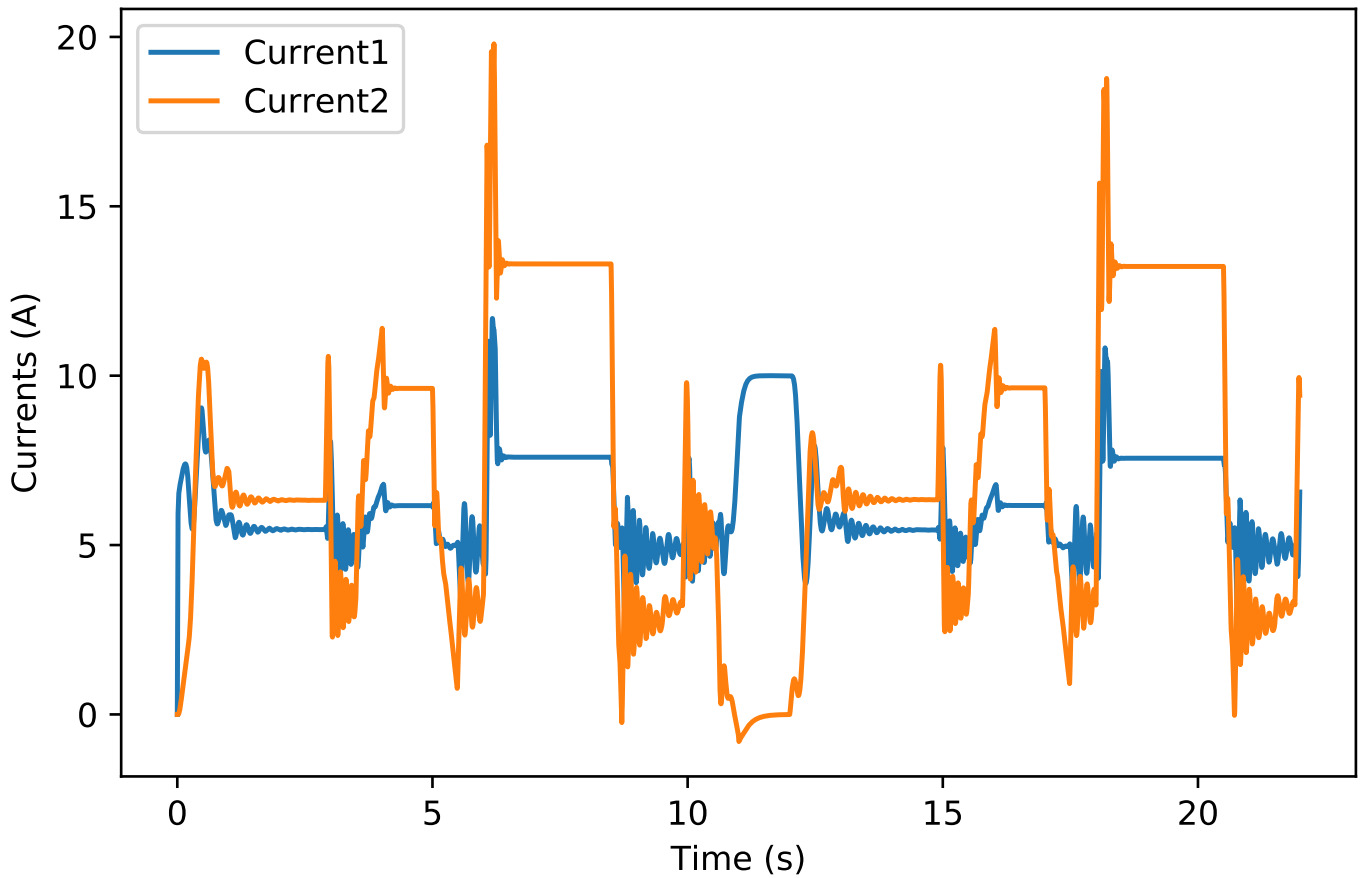
Dataset

Speed



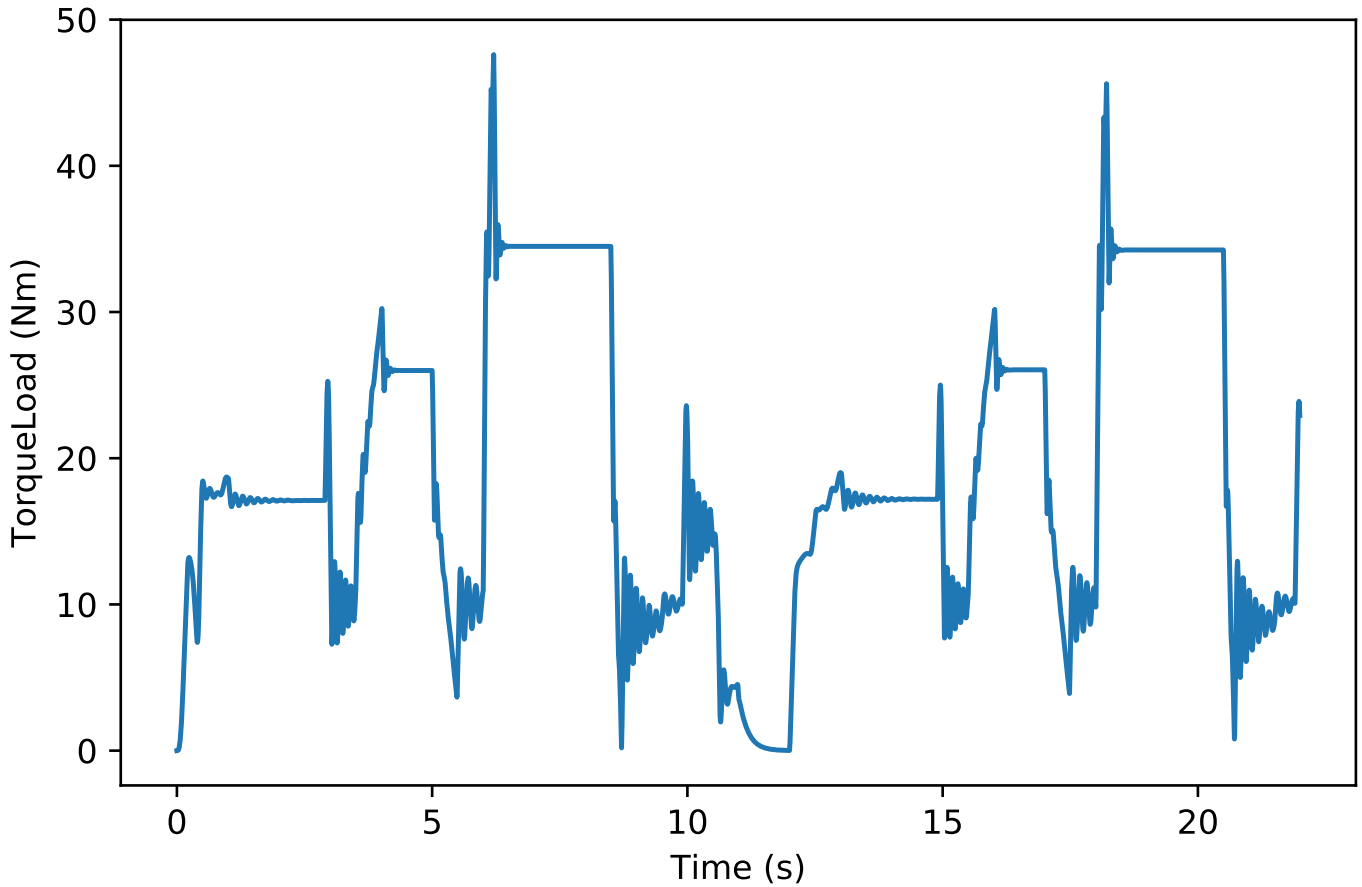
Dataset

Currents



Dataset

Torque Load



Dataset

Train-Test Split

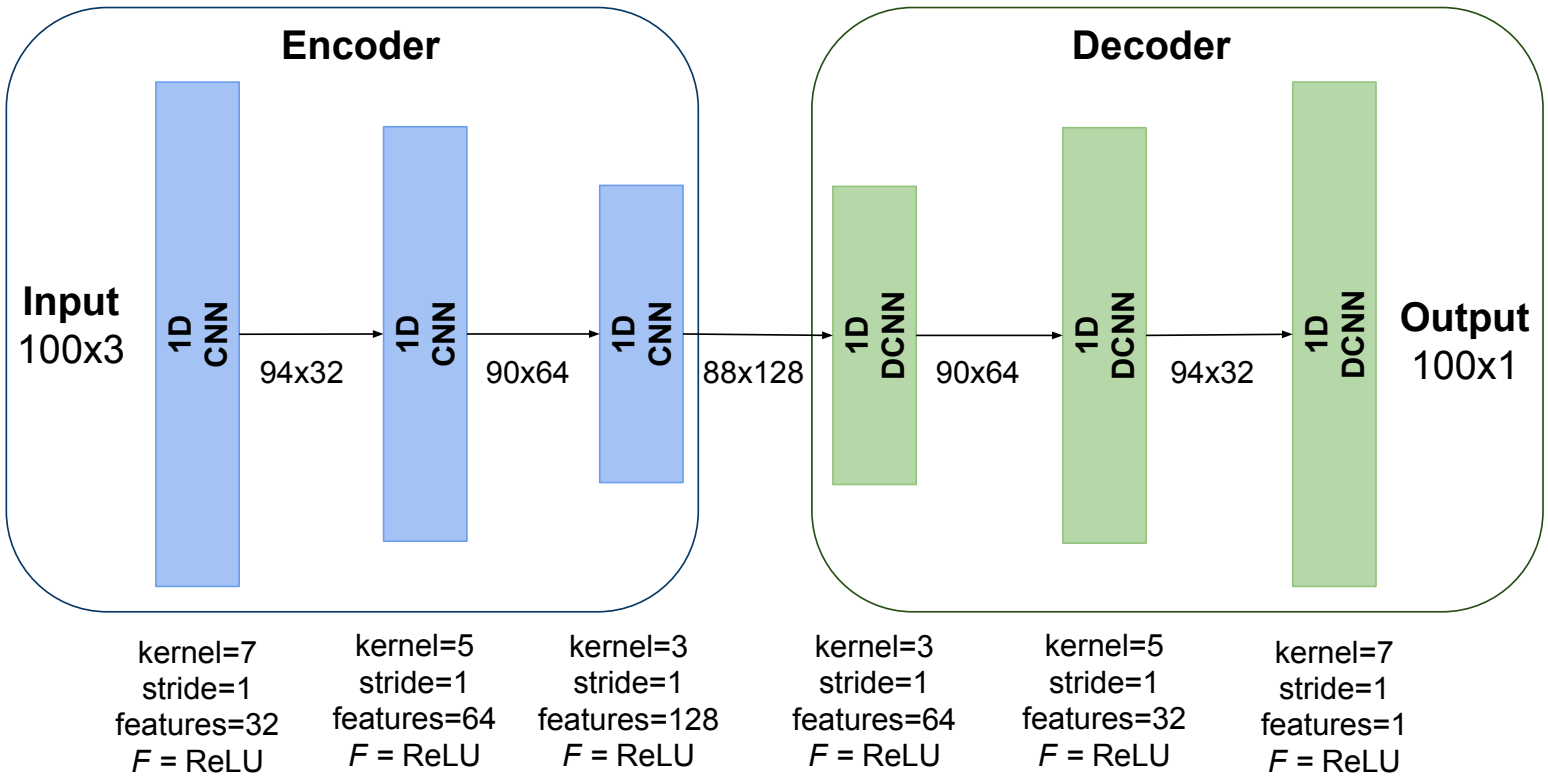
1. Single experiment
2. Train on 0s-839s, test on 839s-1199.75s
3. Window size $w = 100$, stride $s = 1$

Experiments

Convolution network

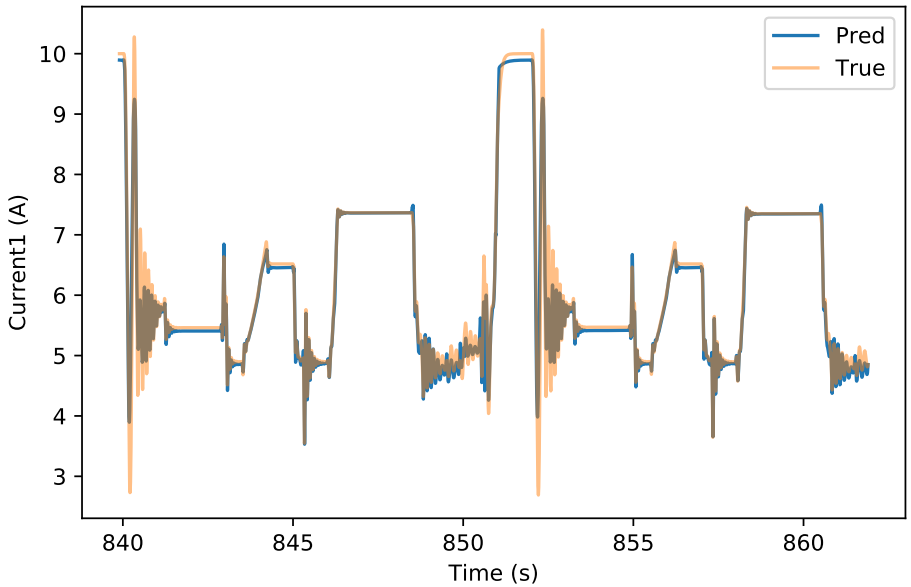
1. CNN and ANN works better then RNN (Miller et al. 2018).
2. Encoder network
   - 2.1 Kernels capture $w \leq 10$
   - 2.2 Signals act as feature channels, no flattening
3. Decoder network
   - 3.1 Implicitly segment different temporal patterns
4. Three outputs, three networks.
5. Input: $w \times 3$ 2-D vector, Output: w

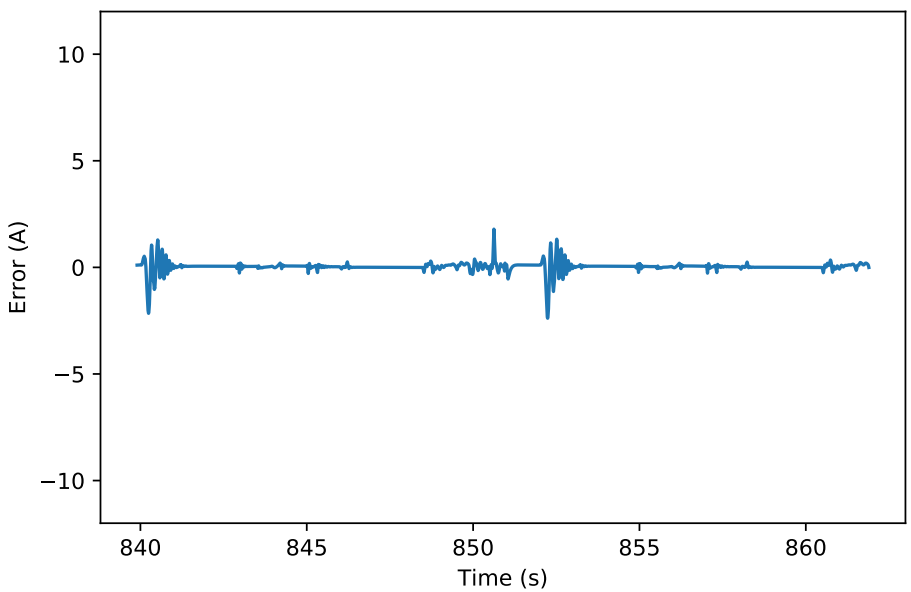
Convolution network



Results

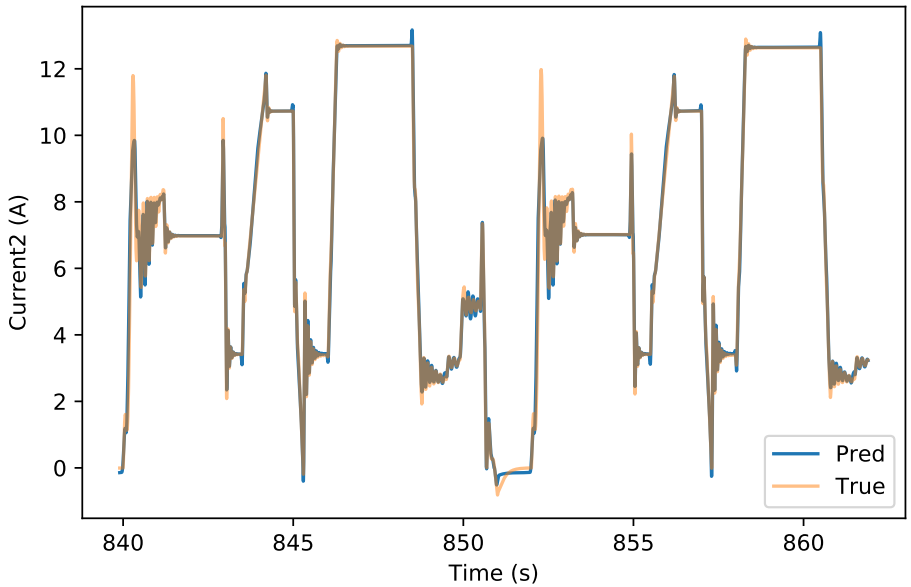
Current1

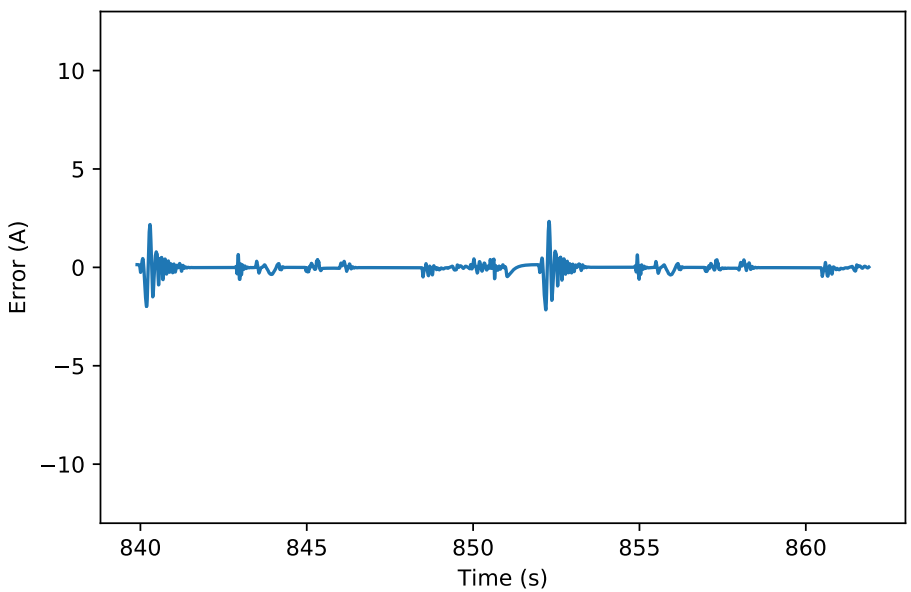




Results

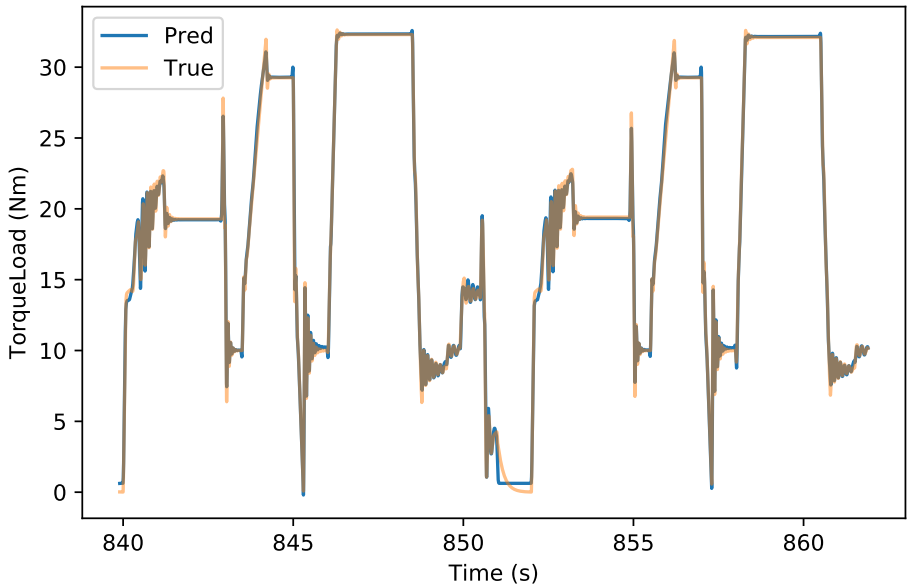
Current2

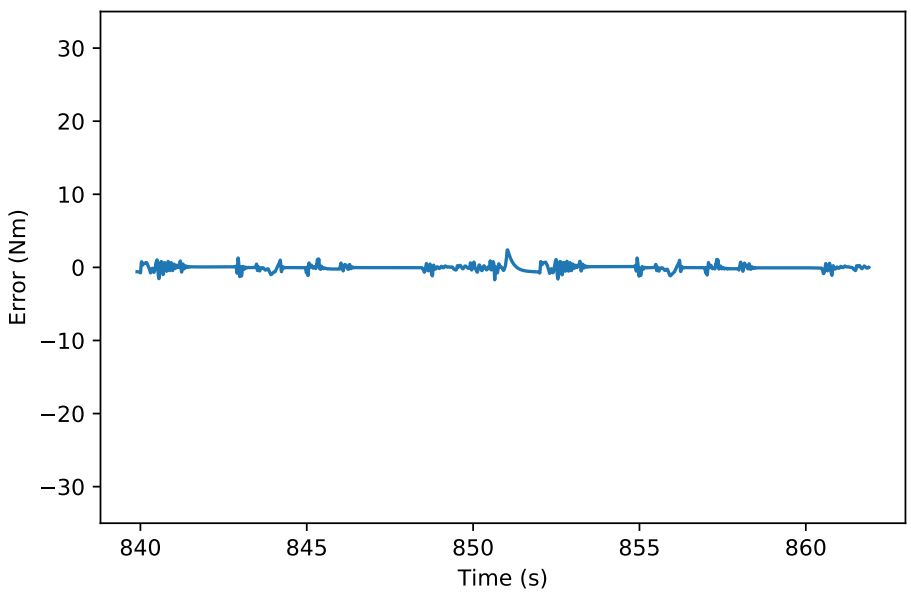




Results

Torque





Thank you!