



ML final project : PERFORMANCE OF NN ON SEQUENTIAL TASKS

Feed-Forward vs LSTM
vs Transformers
Networks

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Results and what to
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INTRODUCTION

- the context awareness of neural network must be improved to achieve great performance on tasks involving sequences.
- Neural networks ability to memorize elements of context is nowhere near the human level
- breakthroughs such as the discovery of transformers neural networks may help close the gap.

LSTM overview

Features

Type of RNN

Memory over time



Unit composition

- 1 input gate
- 1 output gate
- 1 forget gate



Transformer overview

Features



Type of RNN

Attention mechanism



Fields

NLP

Computer Vision





01

MOTIVATIONS



MOTIVATIONS

- Understand how several types of neural networks perform on various sequential tasks
- Investigate the relevance and efficiency of transformers





SENTIMENT ANALYSIS

Complex task that relies on
tone, punctuation, verb
tenses and sentence length
-> requires context
understanding



WEATHER FORECASTING

Time series data is highly
dependent on previous
elements



02

EXPERIMENTS

FIRST EXPERIMENT :

SENTIMENT ANALYSIS

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Goal : based on a set of text samples, infer the sentiment associated with a text

DATA

- Set of IMDB reviews
- Set of Yelp reviews

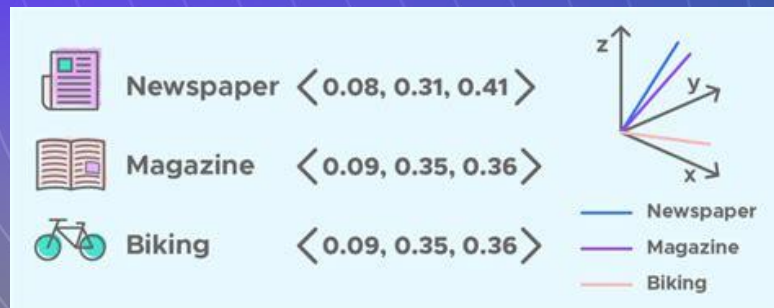
MODELS USED

- Standard feed forward model
- LSTM
- Transformer

WORD EMBEDDINGS

Numerical representations of a word

- used to reduce the dimensions of word vectors compared to the one hot encoding
- and to extract information on the relationship between words



SECOND EXPERIMENT

WEATHER FORECASTING



Goal : Predict the hourly temperature, for one or more time period

Data

Jena Climate dataset
(Max Planck Institute for
Biogeochemistry)
420,550 samples, 15 features

MODELS USED

- Standard feed forward model
- LSTM
- Transformer

Data

1 Temperature

2 Pressure

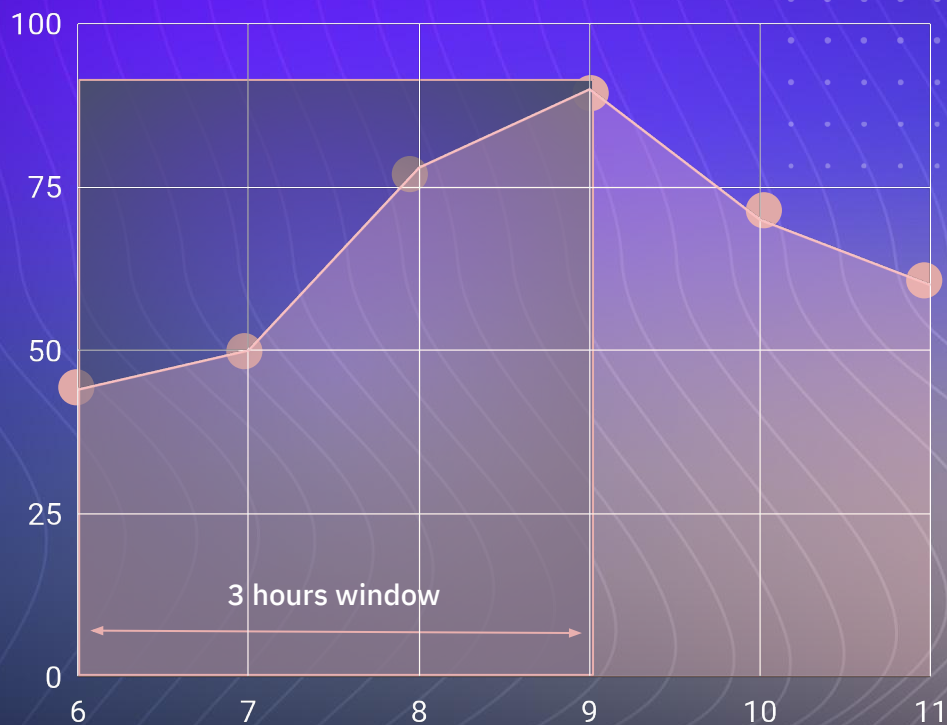
3 Wind speed / Direction

4 Humidity

5 Date & time



Time series windowing





03

EARLY RESULTS

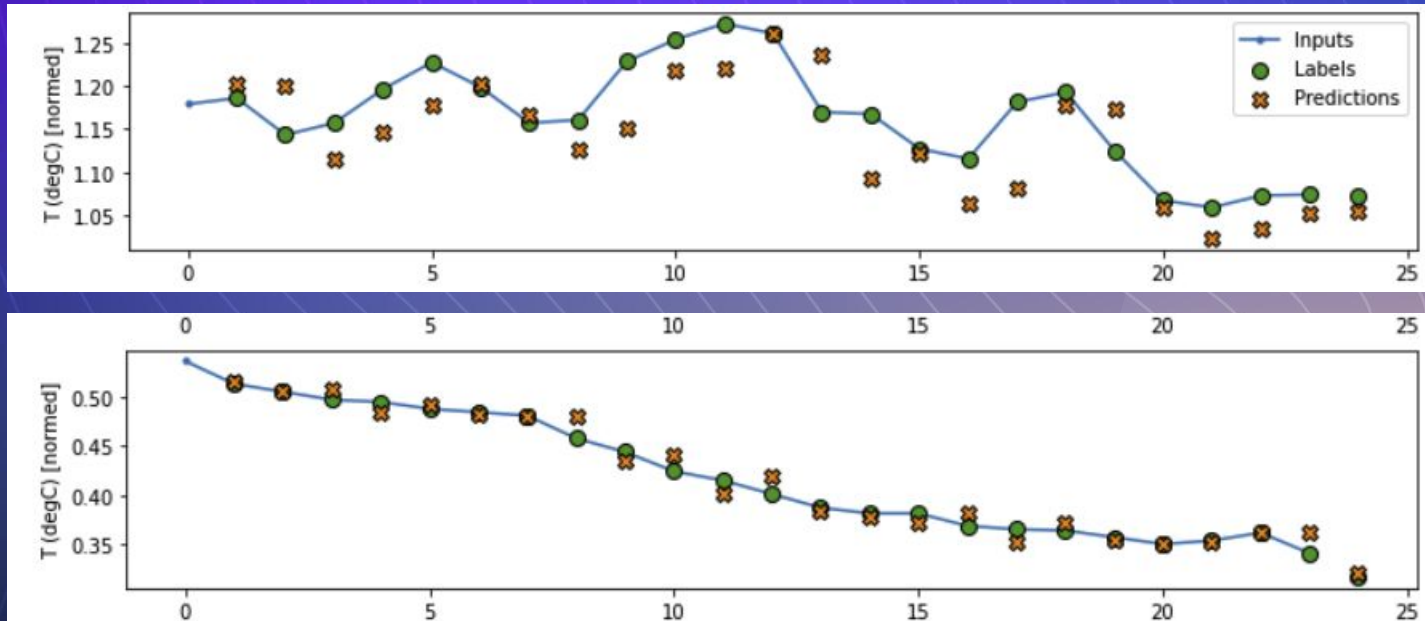


EARLY RESULTS

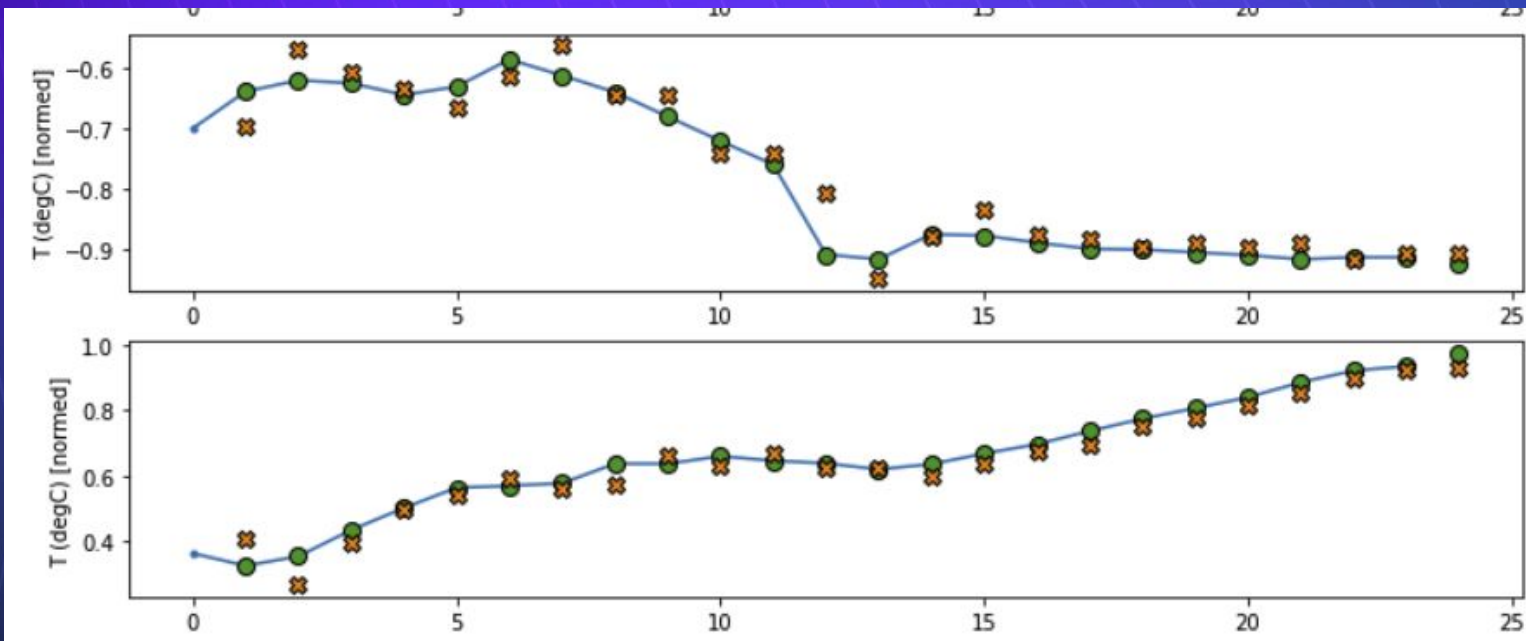
The Feed forward network performs decently however the recurrent network performs better on sequential tasks due to its memory.

We expect the transformer to perform even better considering the attention mechanism

Feed-forward



LSTM





Thanks!

Do you have any questions?