The Data Incubator

Time-Series Forecasting in Energy Applications

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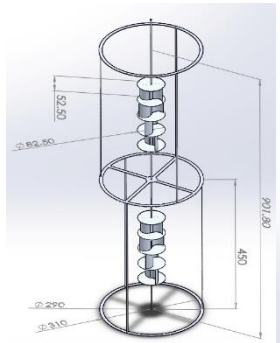
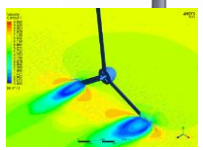
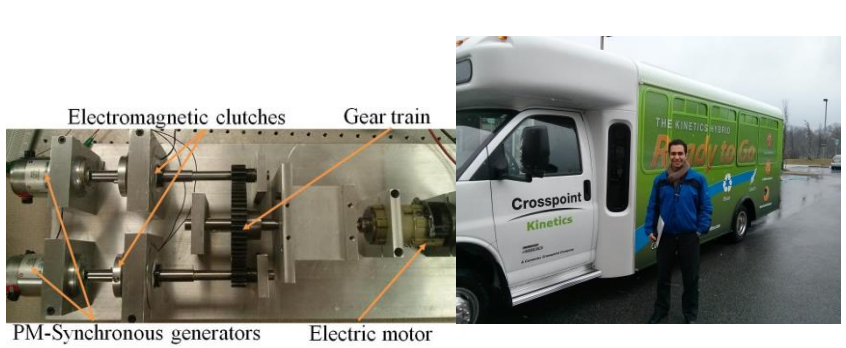
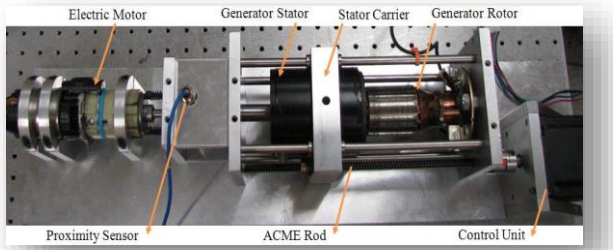
Introduction

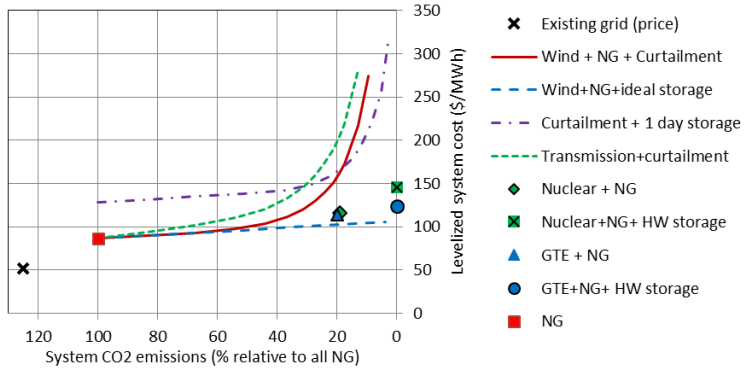
- Background in studying renewable energy technologies from resource assessment and technology development to operational performance and cost analyses.
- Significant interest to **data analytics** and applying machine learning models to achieve more accurate and efficient solutions.

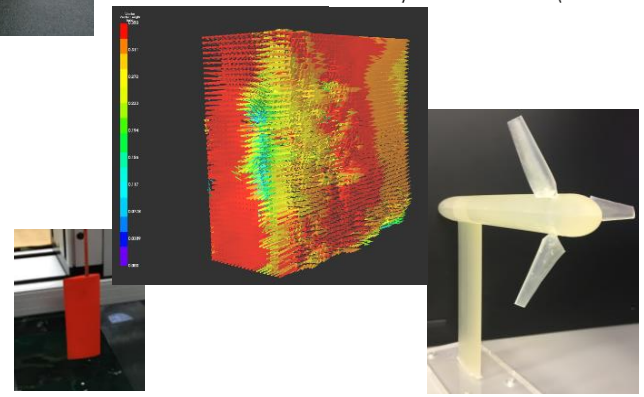








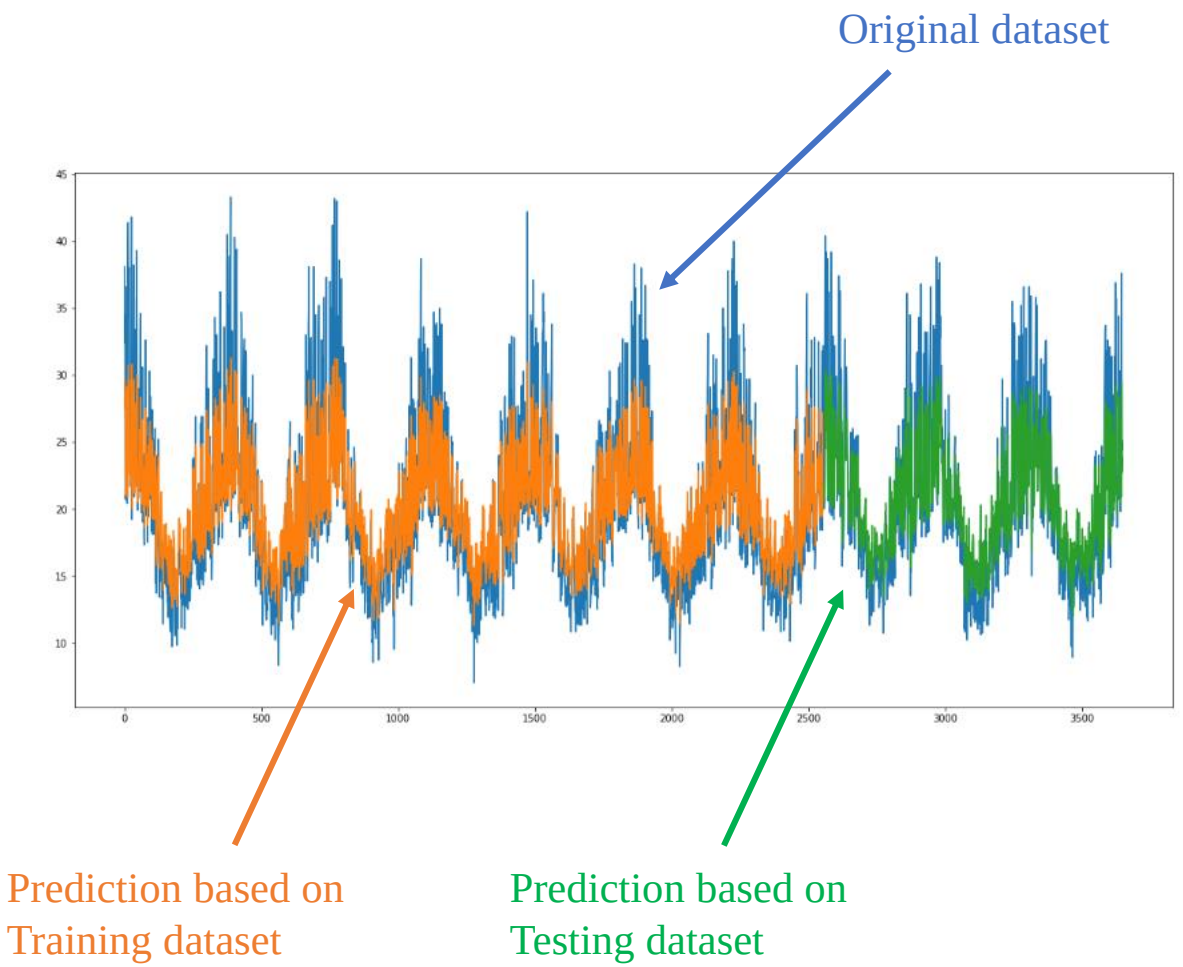




The Challenge Project

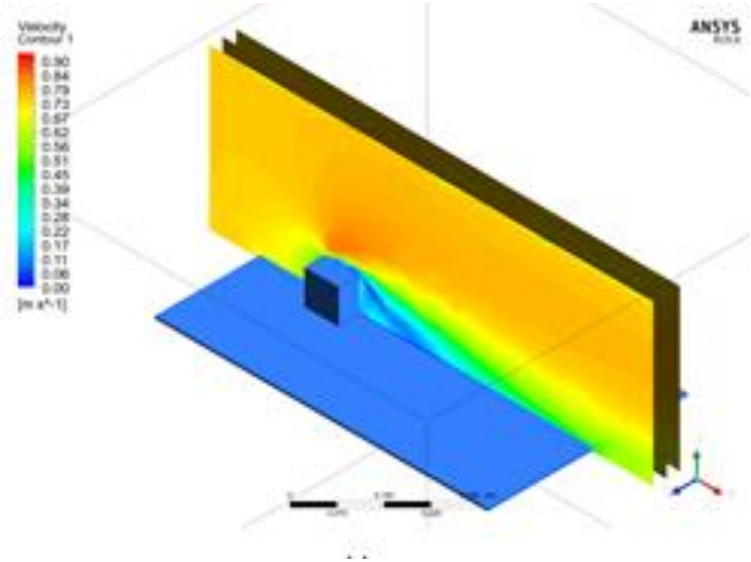
Dataset: A Publicly available 10 year maximum temperature data of Melbourne

1. Data Cleaning & Preprocessing	• Pandas, Scikit-learn • Remove Null Values • Normalization by Scaling
2. Generate Timeseries Training Dataset	• Look Back Window • Split Train/Test
3. Train & Test	• Tensorflow/Keras • LSTM, Bidirectional LSTM, Regression
4. Prediction	• Inverse Scaling • Predict Train & Test
5. Visualization	• Matplotlib • Plot the Predictions

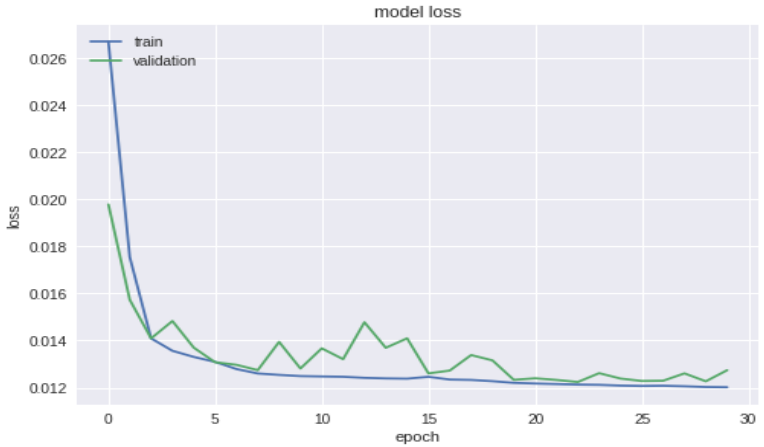


I am studying ANN and LSTM algorithms for obtaining an accurate approximation of the entire flow field for a given inflow condition.

- An in-house computational fluid dynamics model was used to simulate velocity vector fields around a cube at different input speeds.
- For each speed, a dataset ~ 455,000 velocity values was divided into training (70%), testing (15%), and validation (15%) subsets.
- A MLP ANN with 6 layers was used.



	MEA	RMSE	MAEP
u	0.0195	0.0787	1.5900
v	0.0079	0.0157	1.1479
w	0.0104	0.0240	0.9938
total	0.0126	0.0483	0.9389



Challenges:

- Data pre-processing
- Deep learning models
- Machine learning/deep learning libraries

Thank you!