Motion Representation and Prediction Using Artificial Intelligence

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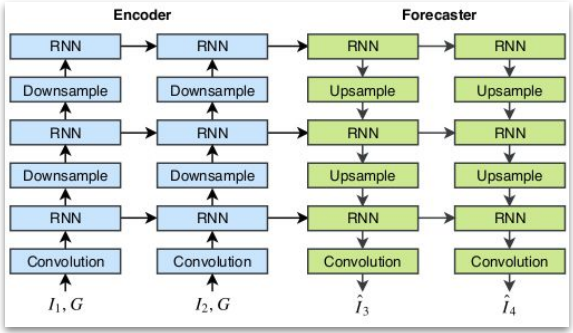
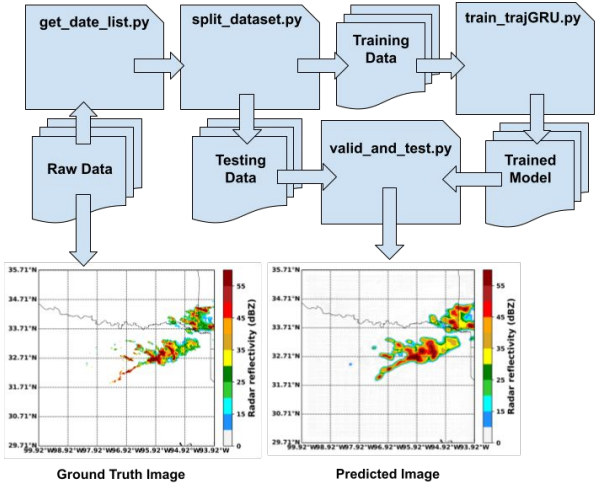
Encoder-Forecaster Structure:



Training and Testing Flowchart:



Mentors:

Shun Yao (Graduate Student), Dr. Haonan Chen (Professor), and Roy Broeren (EiR Mentor)

Project Description

- Our team set out to implement, train, and test a deep learning algorithm called TrajGRU related to motion representation.
- We decided to focus on weather prediction for our project by analyzing the domains of California, Colorado, and Texas. These domains are characterized by different weather features.
- Our team collected past radar reflectivity maps from NOAA's Multi-Radar/Multi-Sensor System (MRMS) and used them to train and test our models.

Goals

- Collect radar reflectivity data in three different locations.
- Each member will train one TrajGRU model in specific location.
- Each member will test the TrajGRU model in specific location.
- Compare effect of location on accuracy between all three models.
- Test model in locations different from where they were trained, which is critical in quantifying the model generalization capability.

Accomplishments

- Collected an expansive dataset of two months for each location.
- Successfully trained three TrajGRU models.
- Successfully tested the trained TrajGRU models.
- Generated charts showing prediction accuracy in each location.

Future Work:

- Given that we were not able to analyze the performance of training in one location and testing in a different location, we plan to carry this on in future semesters.
- Explore the impact of adjusting TrajGRU algorithm in comparison to adjusting the datasets.

Helpful Terms

- Ground Truth: Actual radar data recorded by NOAA.
- RNN: Recurrent Neural Network
- POD: Probability of Detection (Ideally closer to 1)
  - Measures the likelihood of event being detected
- FAR: False Alarm Ratio (Ideally closer to 0)
  - Measures the likelihood of overprediction of an event
- CSI: Critical Success Index (Ideally closer to 1)
  - Accuracy measurement between prediction and ground truth.