Predicting associated costs of wildfires in the U.S.

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Introduction

Wildfires are becoming larger and tougher:

- $2.9 billion spent in 2017 - increased by 12 times compared to 1985.
- Can we use machine learning to predict large wildfires?

Dataset:

- 100,000+ reports on wildfires collected and compiled by Big Local News, a project of the Stanford Journalisn and Democracy Initiative.
- Rich dataset about associated costs (monetary, injuries, personnel deployment) of wildfires along with environmental factors (location, time, weather).

Insights from the data:

- **Spring fires are more common in the east coast** whereas fall fires are more common in the west coast.
- **Large wildfires are not necessarily more destructive** - habitation in Wildland-Urban Interface (WUI).

Predicting Wildfires

Deep Neural Networks (DNN) to predict wildfire costs:

- At the current stage, following inputs are fed into a 5 layered neural network to predict costs (regression): time, location, habitation details.
- Number of layers and hidden units were chosen (almost) arbitrarily with some trial and error.
- Loss function: mean absolute error, activation functions: Rectified Linear Unit (ReLU) in intermediate layers, optimization algorithm: Adam.

Plan ahead:

- Incorporating other features into the learning indirectly - sentiment analysis.
- Training a recursive neural network to learn the geographical spread of wildfires.
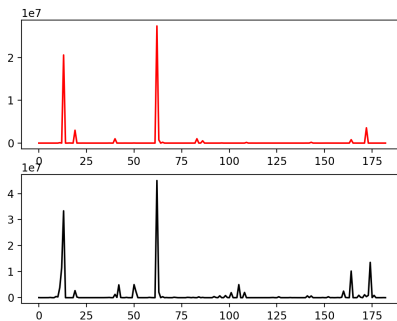
Prediction Results

Figure 1: Wildfire cost predictions (top) and true costs (bottom).

Insights:

- Predictions are qualitatively accurate.
- Next step is to incorporate more features and hyperparameter tuning.

Thank you.