FLARE

Fire Likelihood and Risk Estimation

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The Problem

7.4 million acres burned annually

$2.4 billion in damages a year

Thousands of lives affected

Goals

Research
different machine learning models

Develop
accurate approaches to wildfire prediction

Visualize
fire risk for individual or professional use

Existing Solutions

Mathematical Models

Traditional Machine Learning

Deep Learning Approaches

Datasets

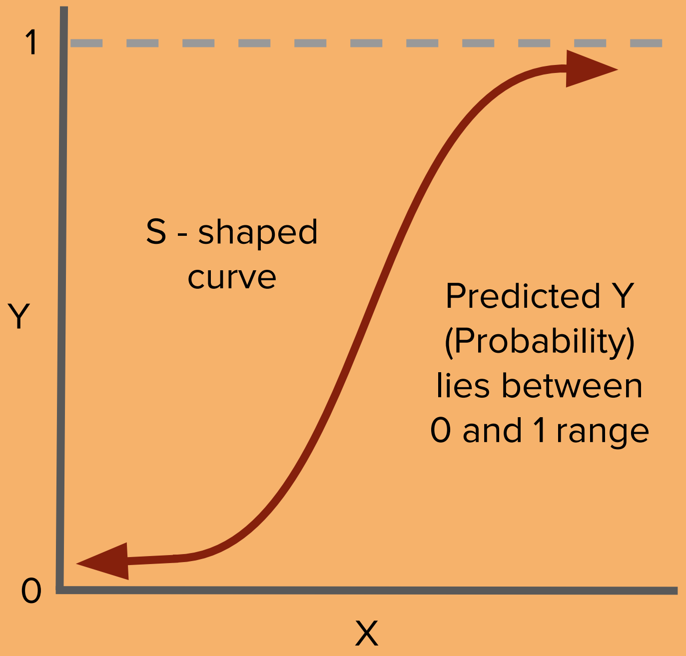
UCSB

Special thanks to
Dr. Isaac Park

Google
Earth
Engine

Logistic Regression

Baseline Model



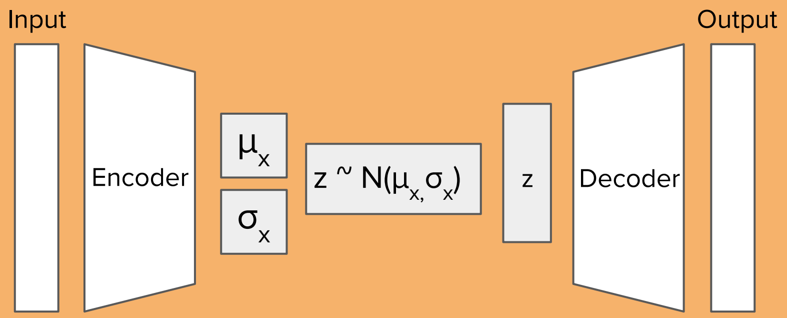
Trained from 2003-2013

Predictions for 2014-2017

Average ROC/AUC Score: 0.68

Variational Autoencoder

Spatial Dependencies



Preprocessed data into images

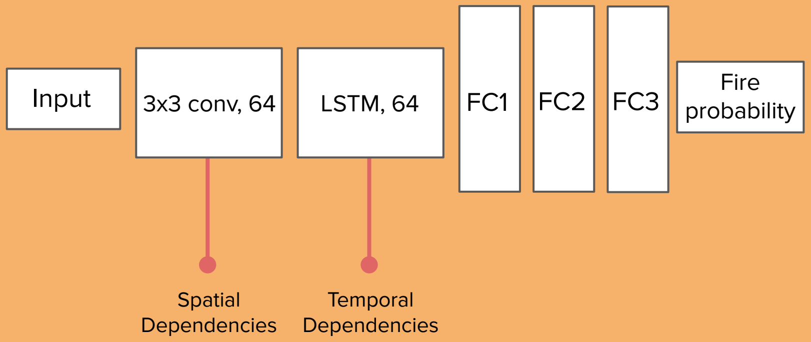
Average AUC: 0.75

10% improvement over LR

LSTM + CNN Hybrid

Spatial & Temporal Dependencies

Model Architecture



Loss function

$$L = |y_{true} - y_{pred}| \times \min(10^5, \max(1, 10^{(y_{true} - y_{pred}) \times 100/k}))$$

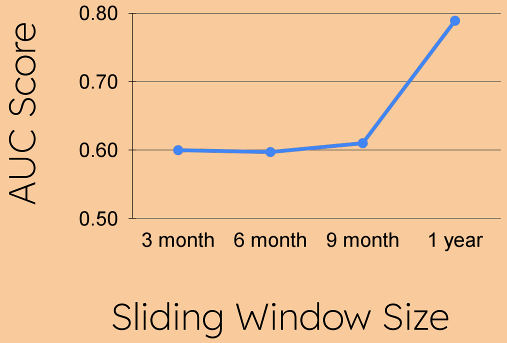
Average AUC: 0.79

5% increase over VAE

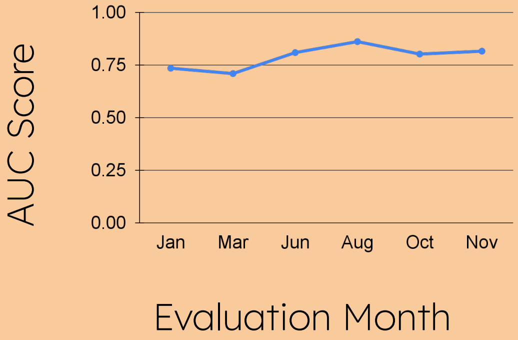
16% increase over LR

Further Analysis

Effect of Varying Sliding Window Sizes



Effect of Time of the Year on Model Performance



DEMO

Conclusion

- Outperformed existing models by 2.6%
- Applicable for property/area fire risk assessments
- Interactive visualizations for California

THANK YOU

Be aware, be prepared, trust Flare