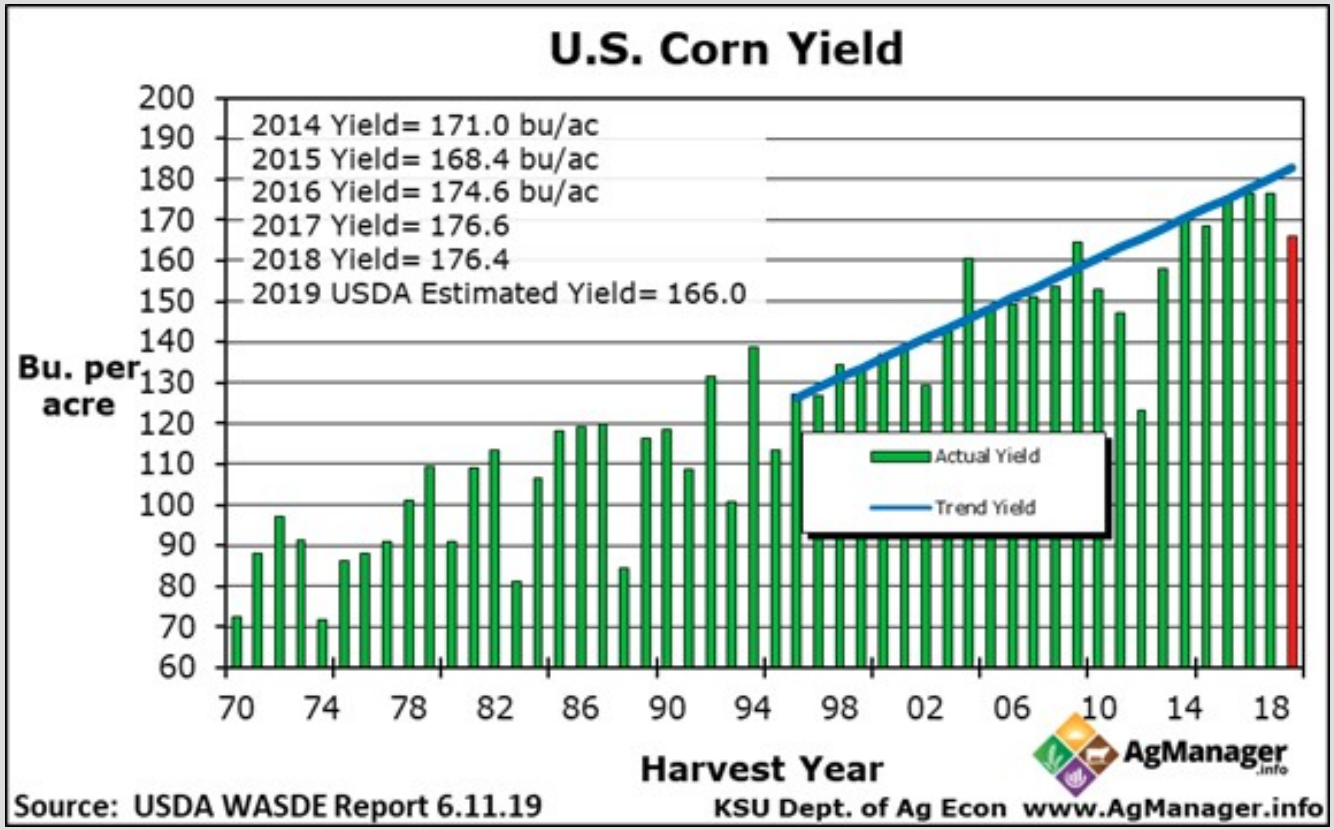
The Cornacle

Prediction of U.S. corn production using satellite images

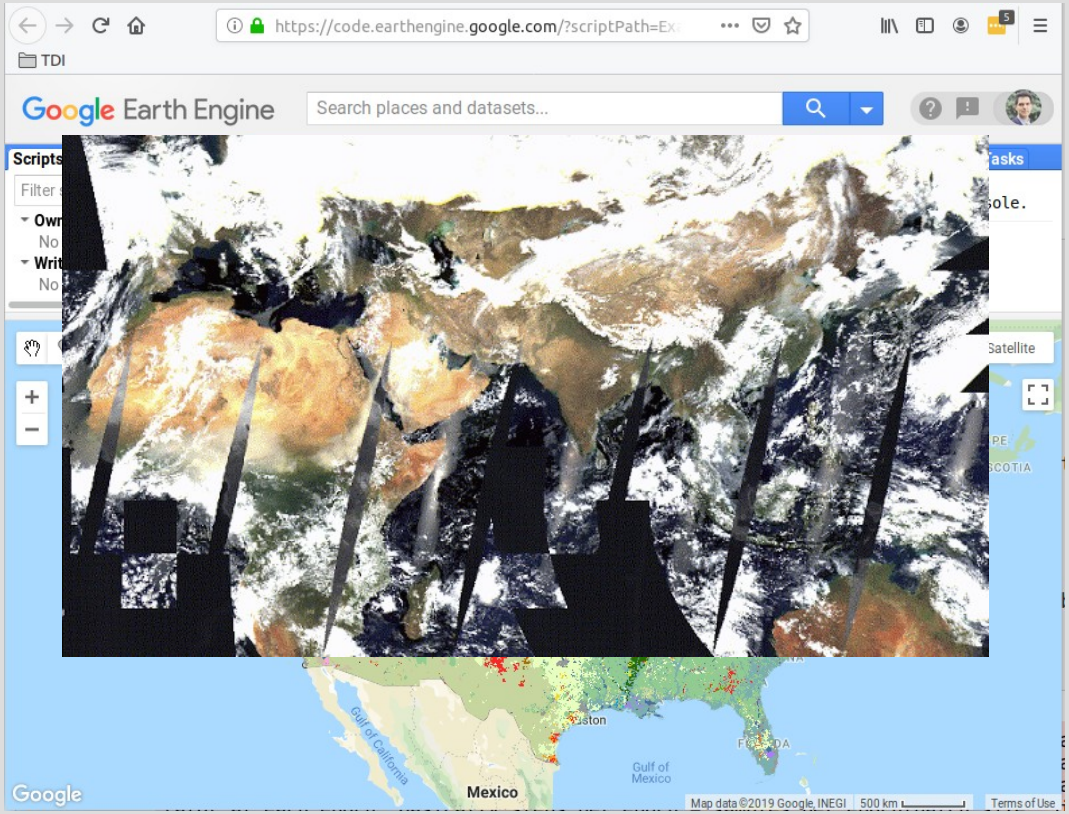
James Lederman

USDA World Agricultural Supply and Demand Report (WASDE)



https://www.agmanager.info/grain-marketing/grain-supply-and-demand-wasde/us-corn-yields

Getting Satellite Images with Google Earth Engine API



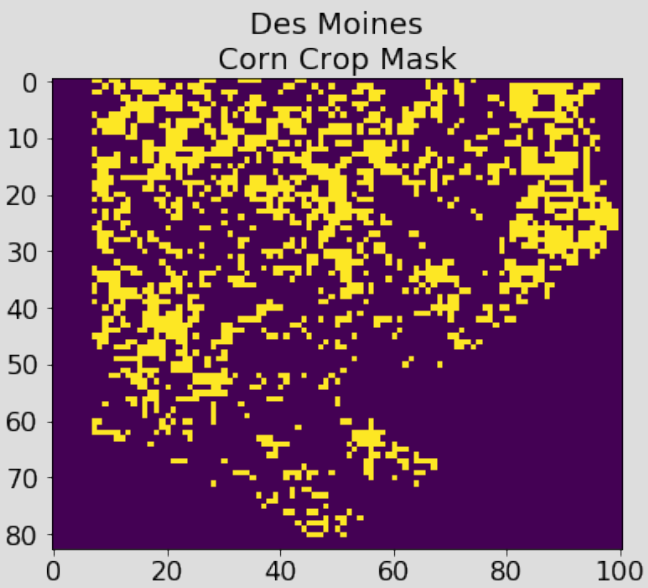
Data Sources

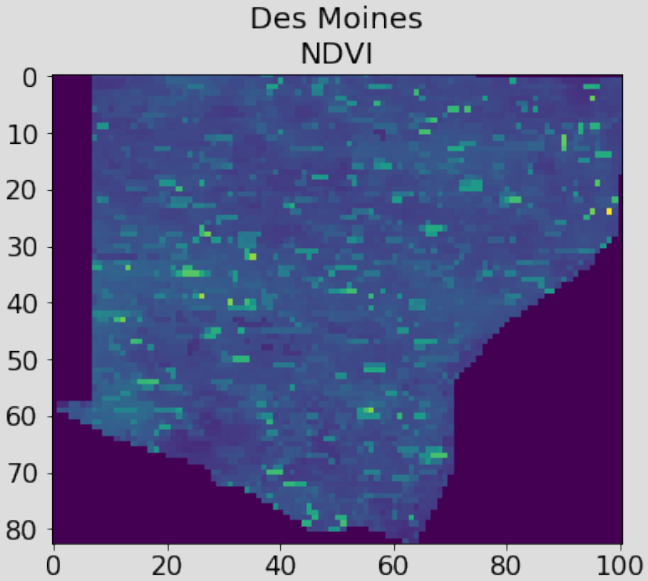
NASA Jet Propulsion Laboratory
Imaging data from 2 MODIS
Earth-Observing Satellites
launched in 1999 and 2002

Data:

1. Essentially, the “greenness” of surface vegetation

- Measures crop progress and health
- Data is available every 8 days





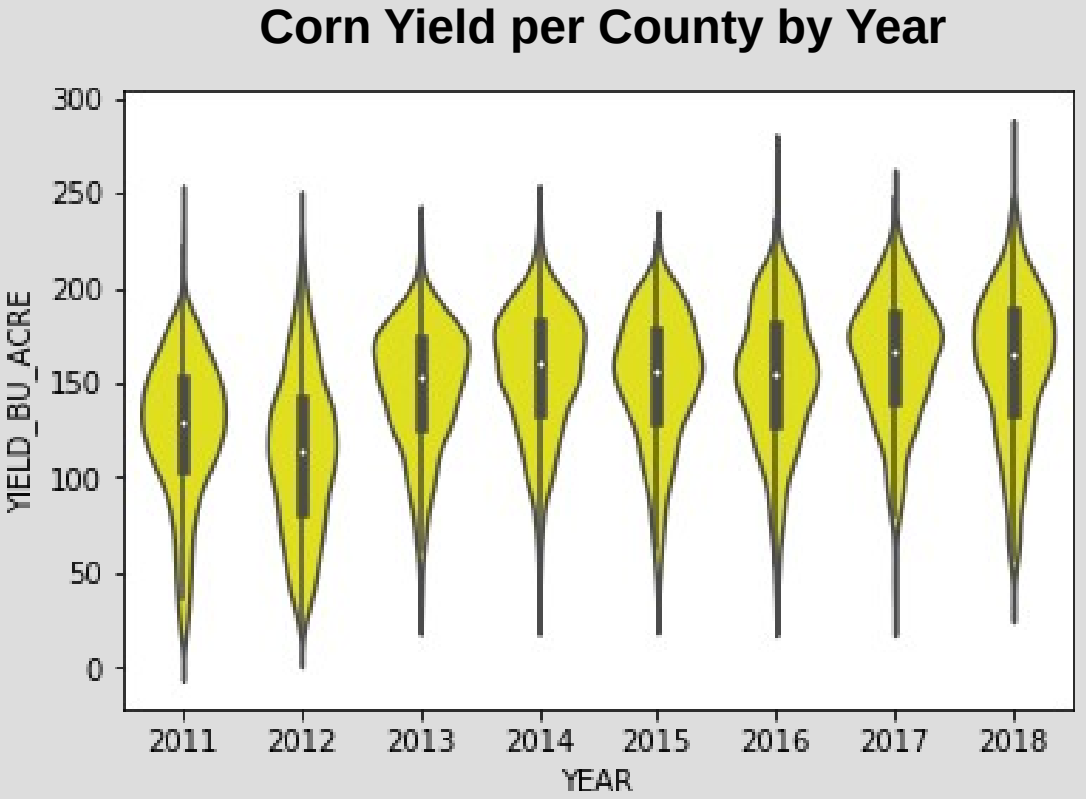
Target Data

US Department of Agriculture
National Agricultural Statistics Service

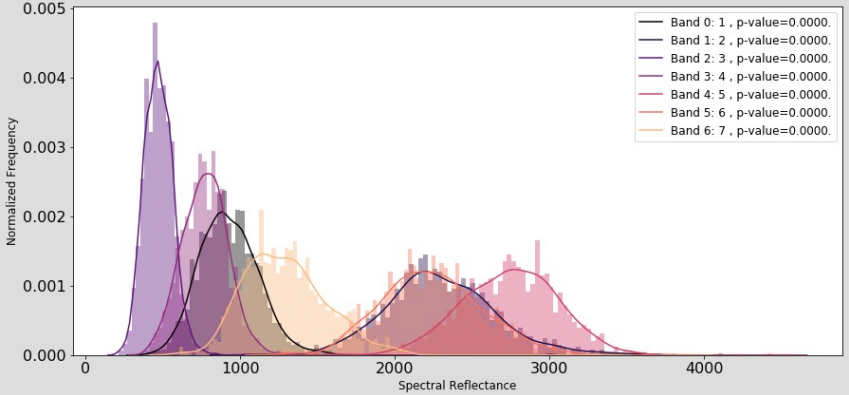
Data:

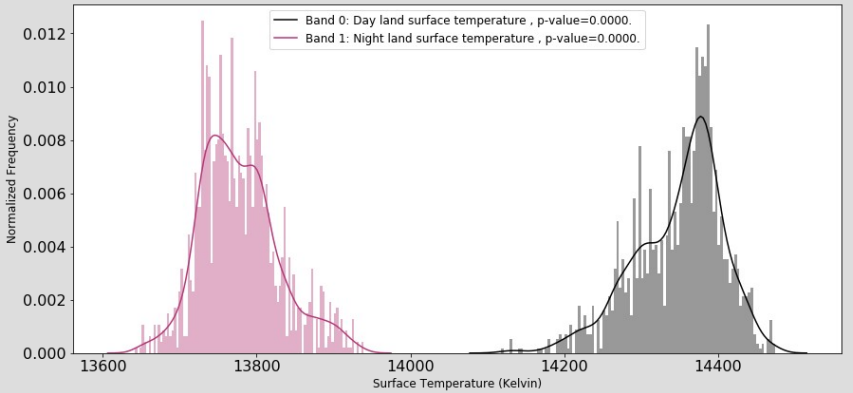
1. Corn Yield by County per Year

2. Acres Planted
- Multiply by Predicted Yield to get Total Production

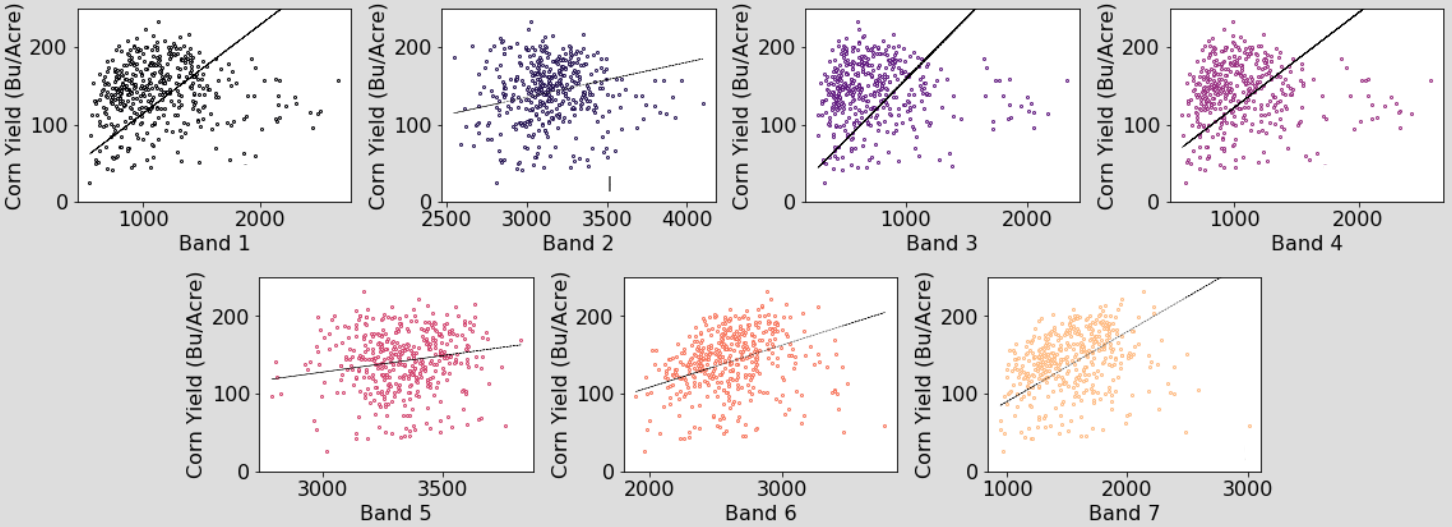


Distributions of Satellite Image Spectra from Corn Fields

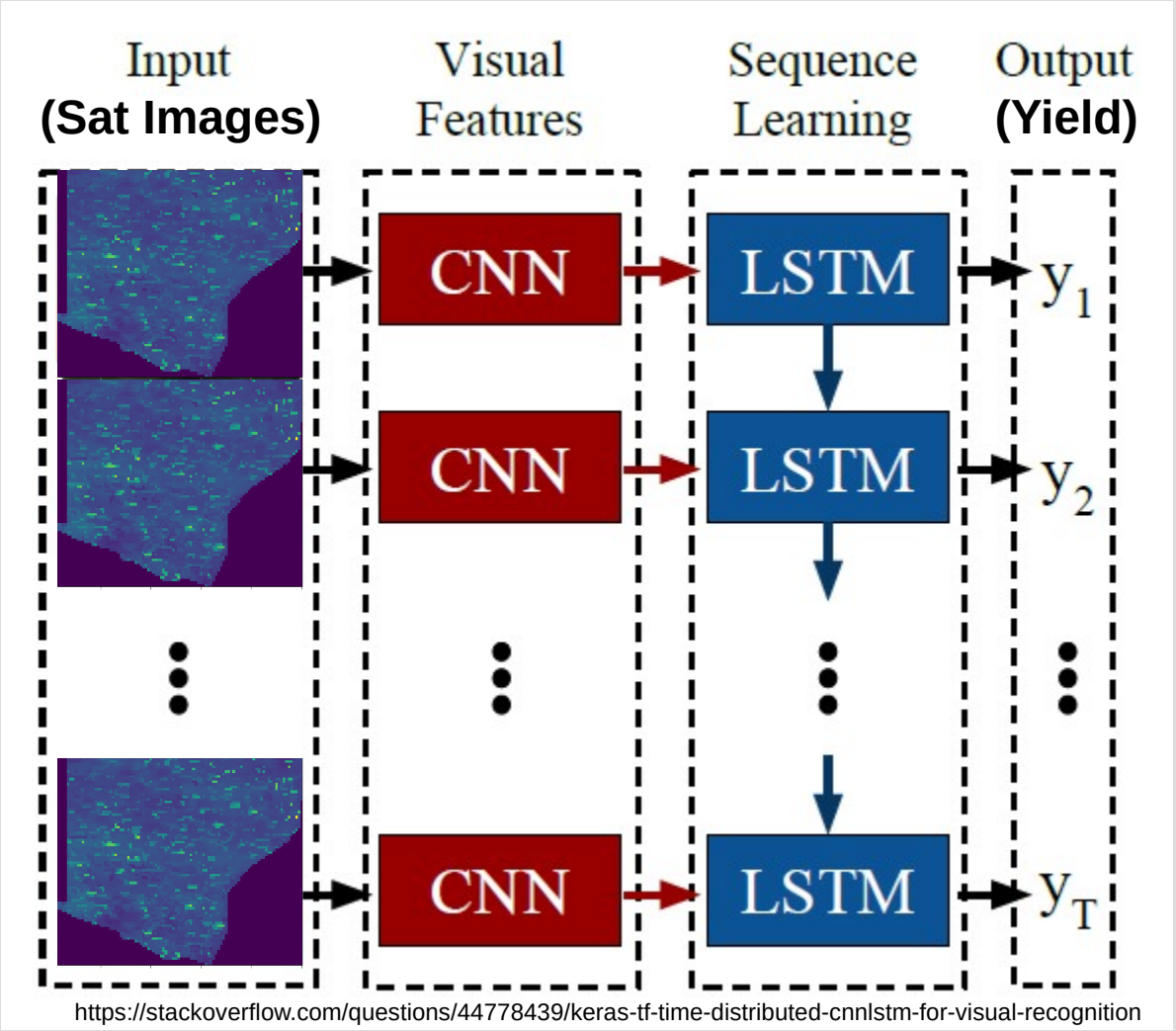




Correlations of Mean Spectral Values with Corn Yield



CNN-LSTM Modelling



https://stackoverflow.com/questions/44778439/keras-tf-time-distributed-cnnlstm-for-visual-recognition

Model Evaluation

Model	MAE (Bu/Acre)	% Error
CNN(2D)-LSTM	18.22	13.1
CNN(Sep2D)-LSTM	21.54	15.9
CNN(3D)	94.1	60.6