COVERED IN BEES!!

Exploring causes of colony loss and the predictive power of data

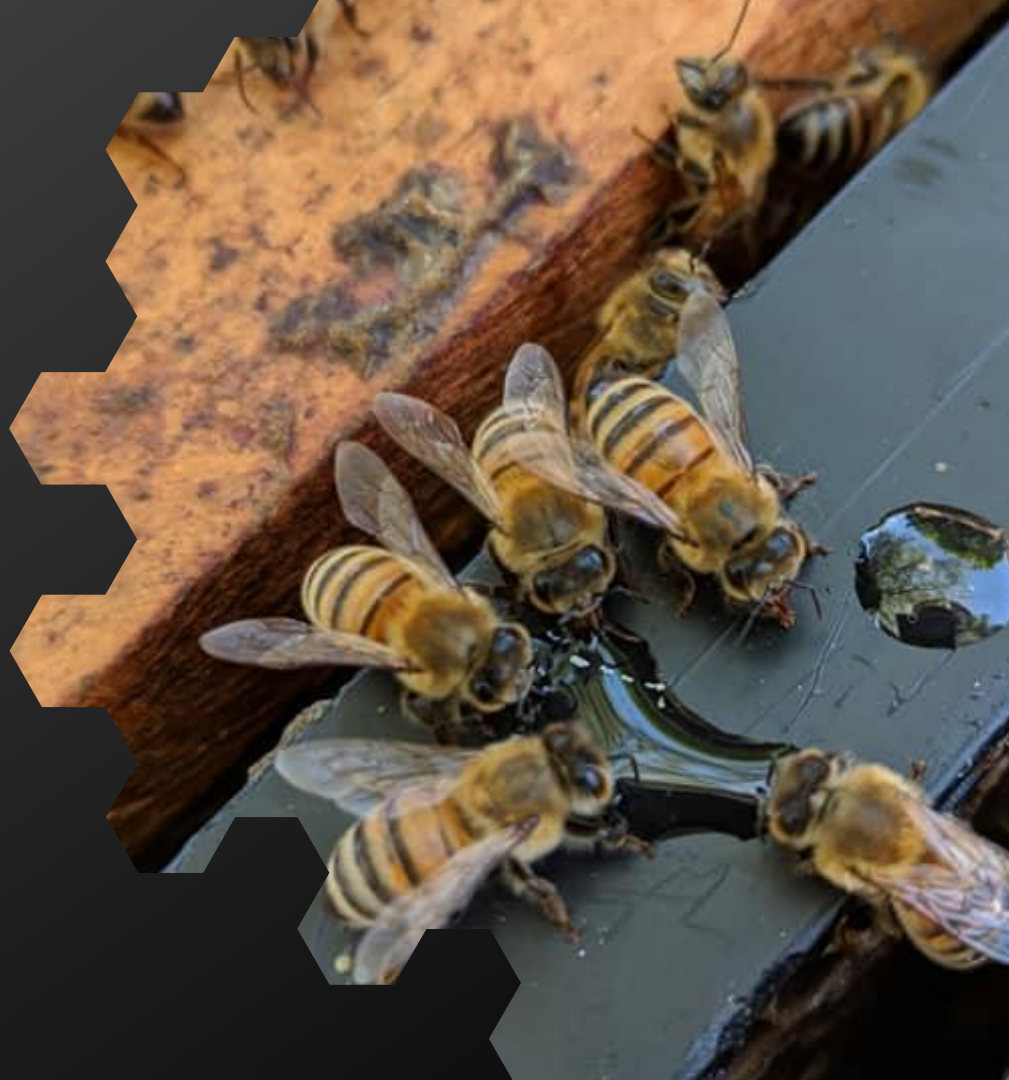
COLONY COLLAPSE

Documented back to 1869

Disappearing disease
Spring dwindle
May disease
Autumn collapse
Fall dwindle…

Named colony collapse disorder as of 2006, when attrition climbed dramatically

The USDA has been keeping data on bees since 2015.



REAL ECONOMIC IMPACT

FOOD

Almonds & Avocados

INDUSTRY

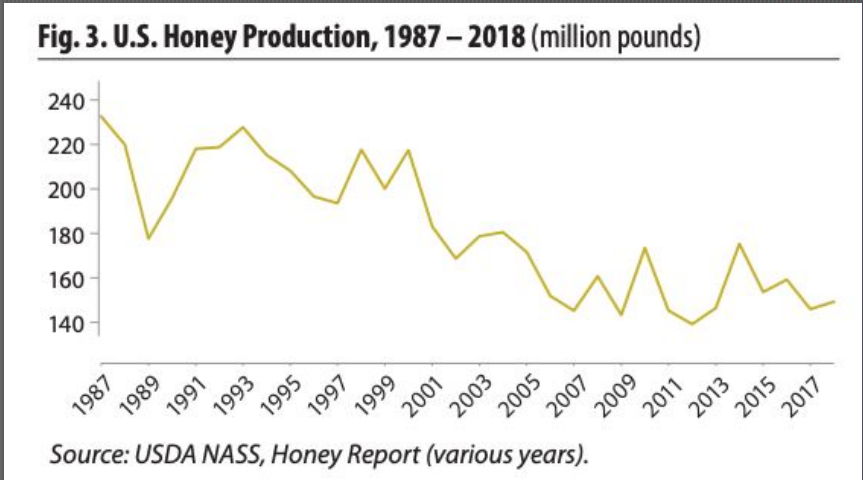
Cotton & Timber

SANITY

Coffee & Tea & Wine

MEDICINE

Aspirin & Morphine



WHAT DATA DO WE HAVE?

SEASONAL COUNTS

01

Starting colony and lost colony numbers

WHERE AND WHEN

02

State, year, quarter. Plus, extrapolated region and subregion

CAUSES OF DEATH

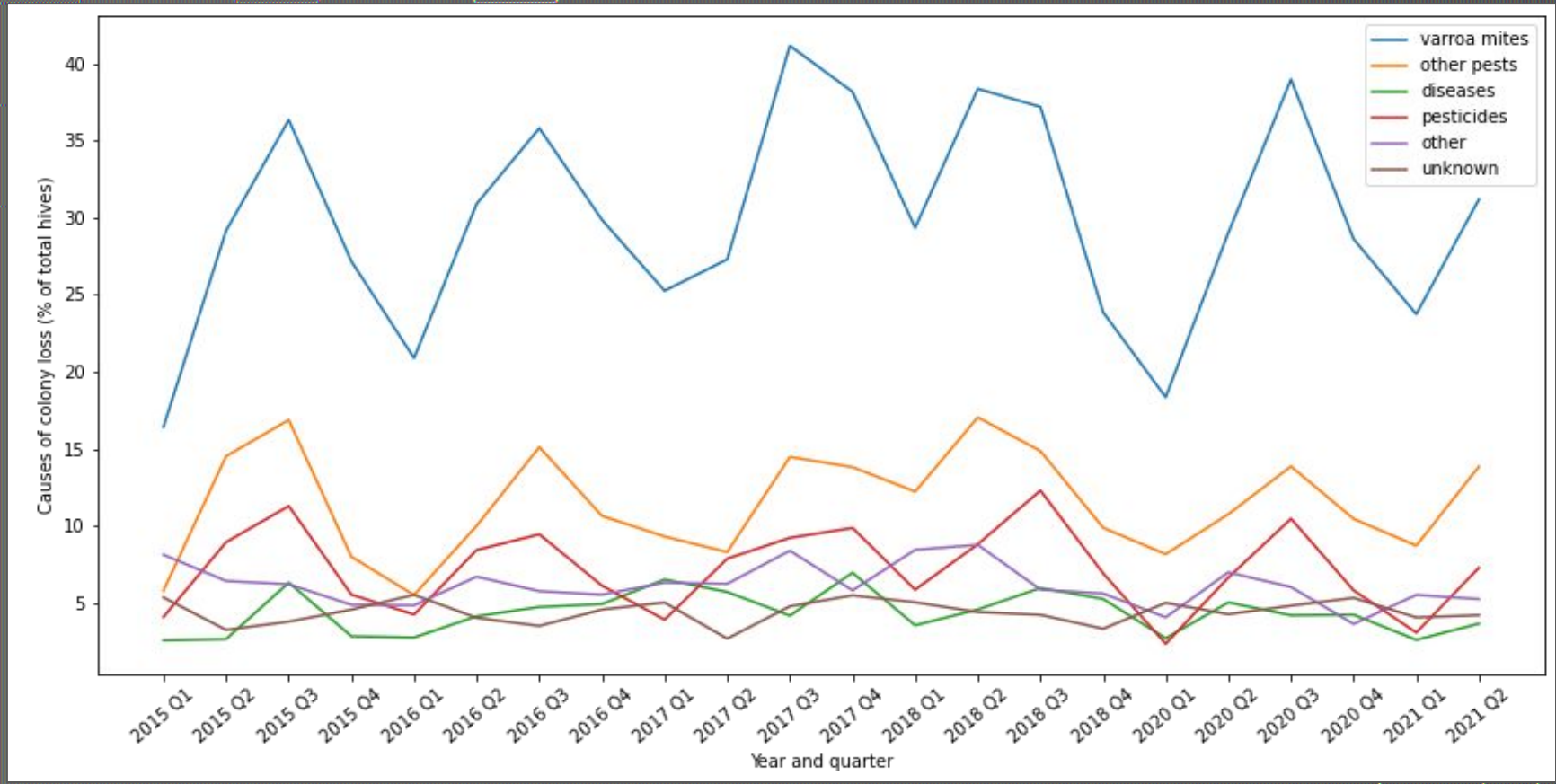
03

Varroa mites, pesticides, other diseases, pests, and “unknown”

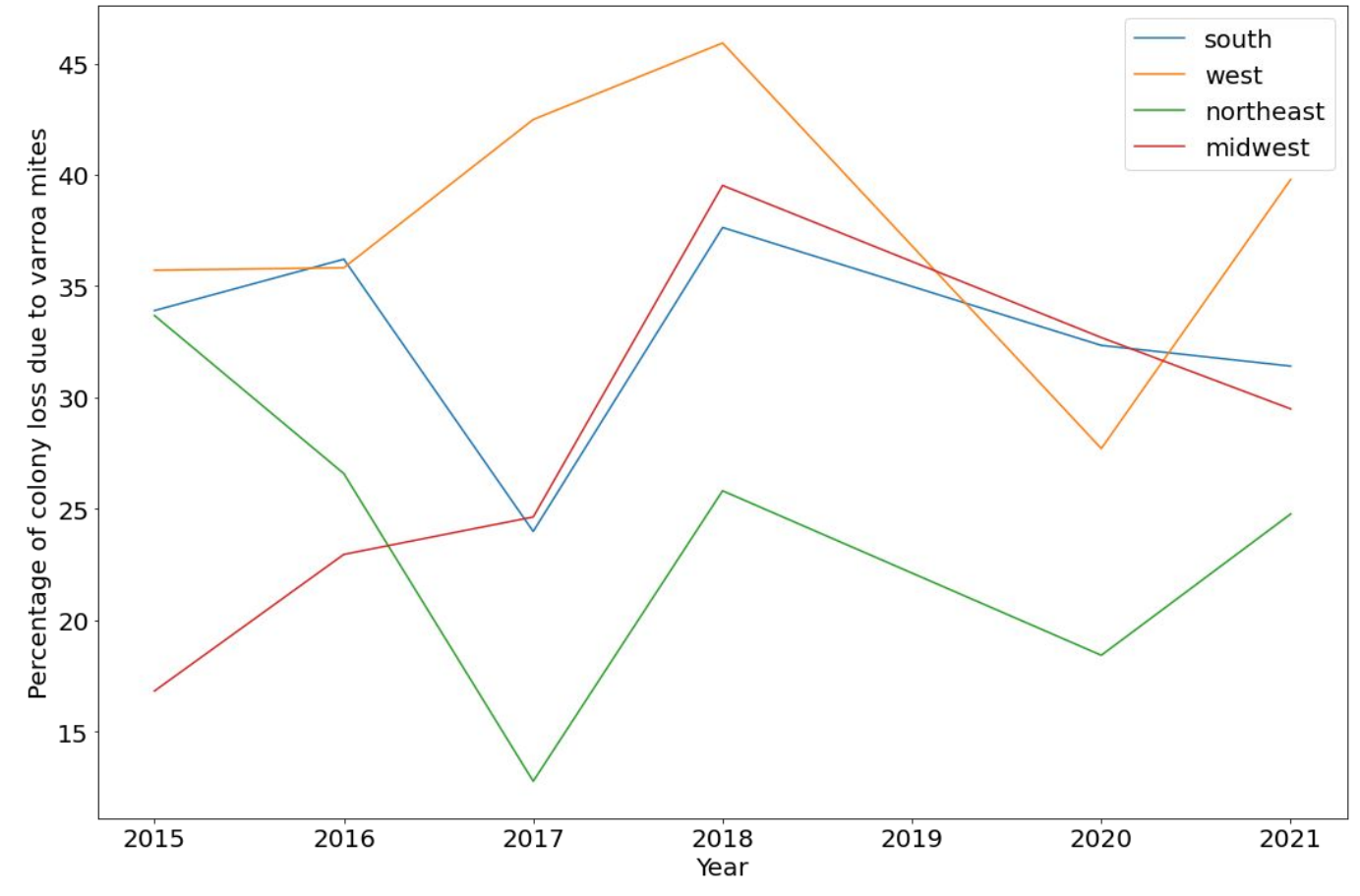
ABOUT THE PROJECT

Is it possible to predict the largest contributors to colony loss with the data available and, if so, what are those predictors?

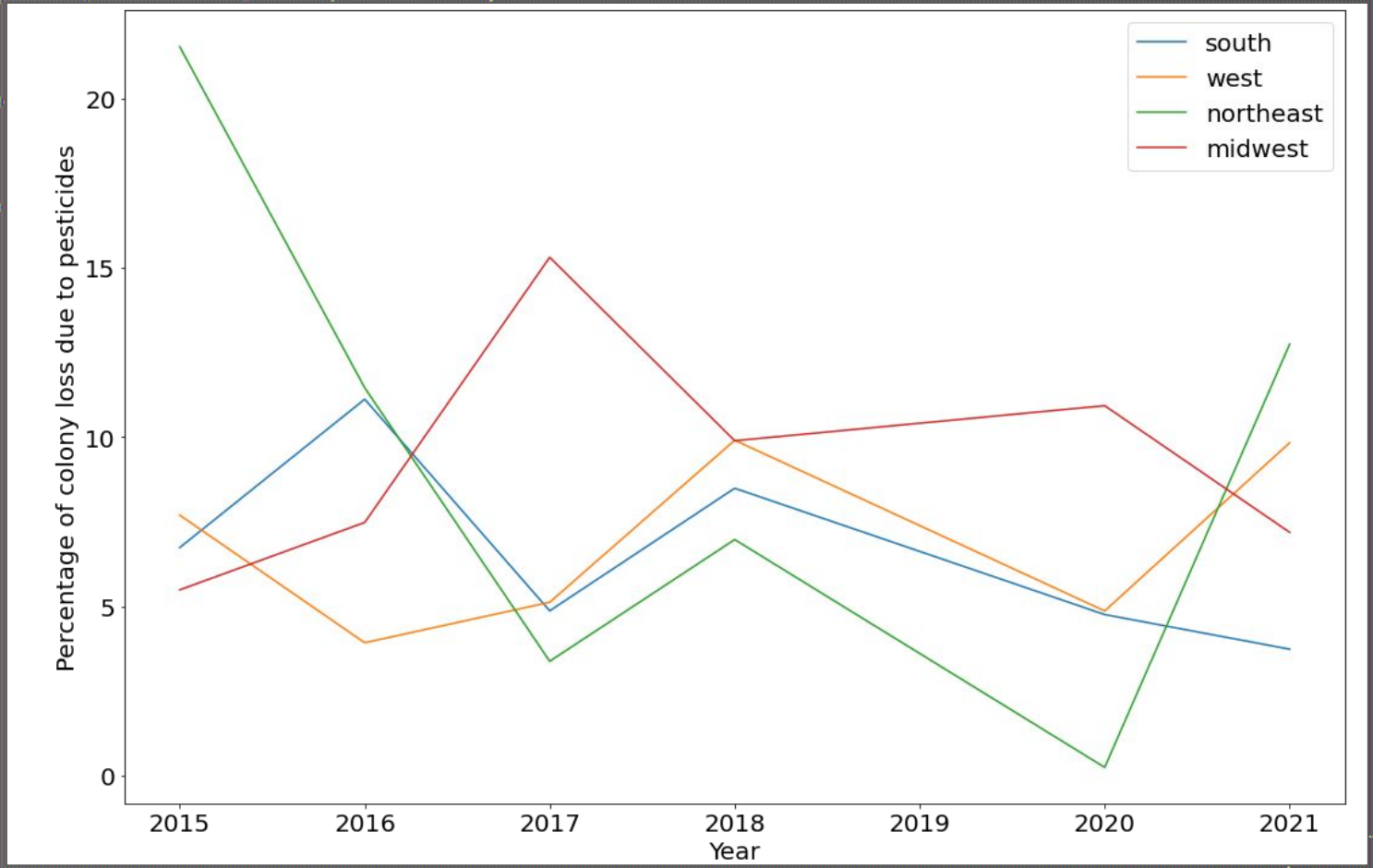
STRONGLY SEASONAL DATA



NO OBVIOUS PATTERNS



NO OBVIOUS PATTERNS



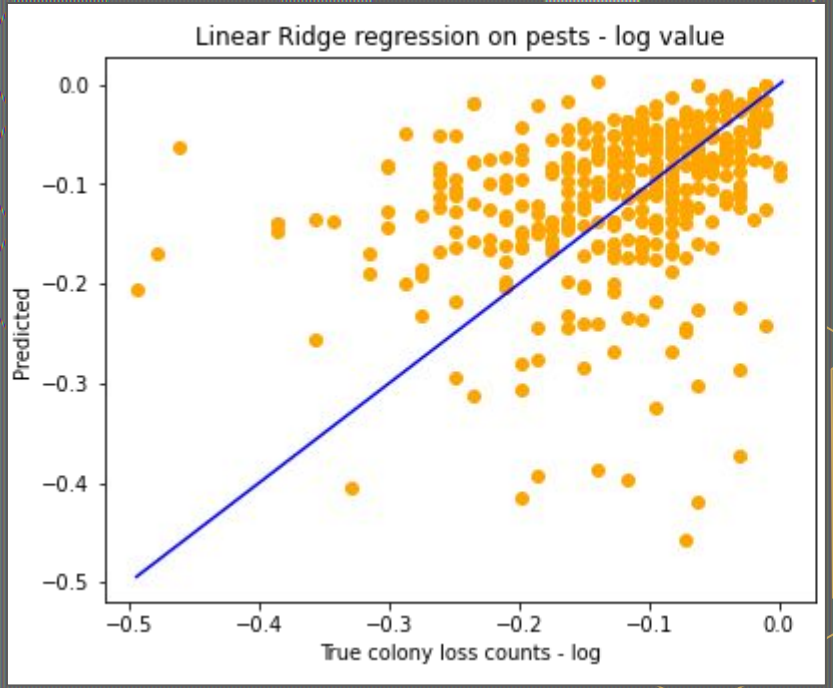
PREDICTION ENGINE

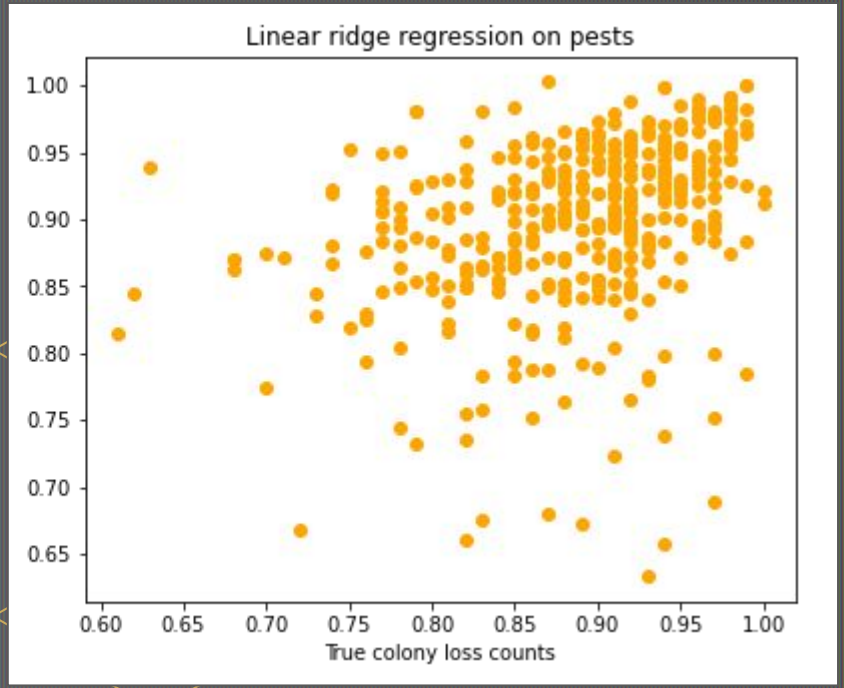
ABOUT THE ANALYSIS

A sub-type of linear regression good for sparse data

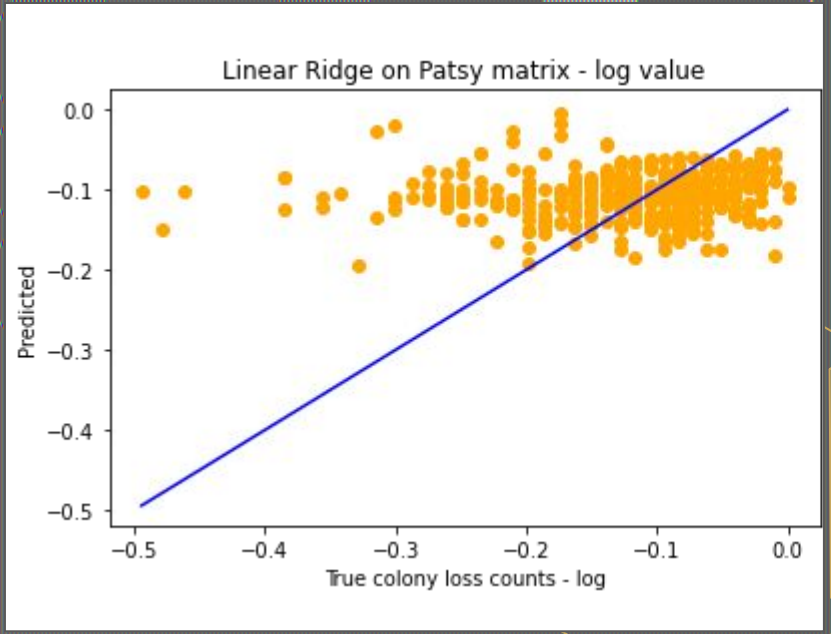
A lot of decision trees

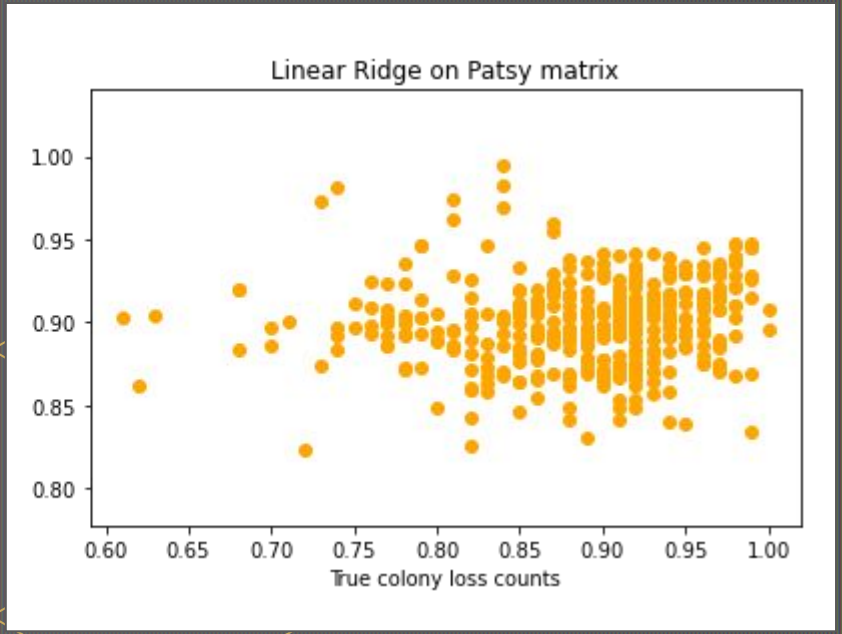
Seldom used but well suited here due to time constraints



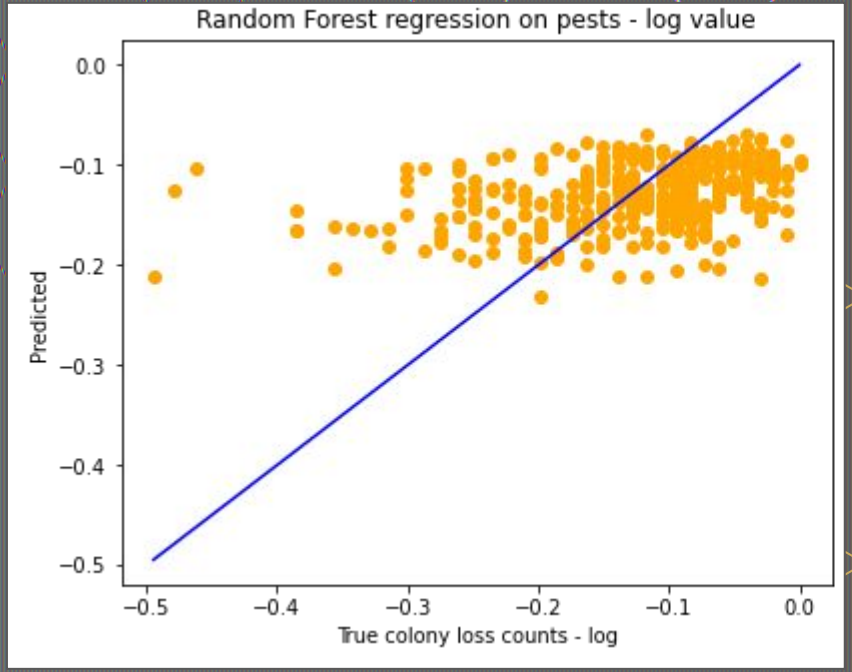


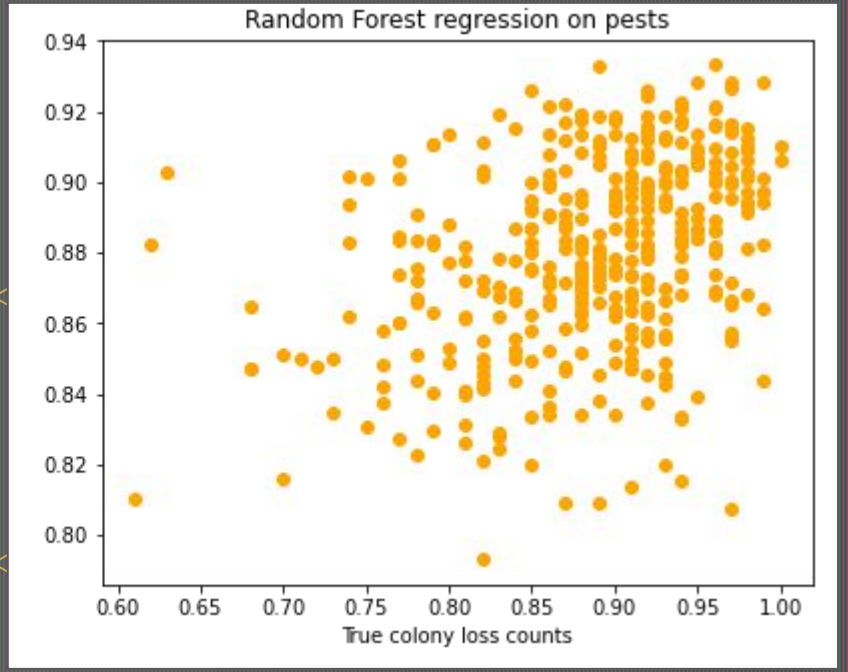
ONE OF THE TOP PERFORMING MODELS: PREDICTIONS BASED ON ALL PEST DATA - LINEAR RIDGE





ONE OF THE TOP PERFORMING MODELS: PREDICTIONS BASED ON PATSY MATRIX - LINEAR RIDGE





ONE OF THE TOP PERFORMING MODELS: PREDICTIONS BASED ON PESTS - RANDOM FOREST

BY THE NUMBERS

THE BEST MODEL

0.047

Mean absolute error

0.077

RMSE

0.132

R-squared

Random forest - all pest data

ABOUT ME

I've been a beekeeper since spring of 2019 and hosting hives since 2017.

Springboard Data Science student
Oct 2021 - Apr 2022

www.github.com/squareleaf

www.linkedin.com/in/tiffanydgreen/

THANKS

Many thanks to my mentor, Julian Jenkins III, and his endless patience

USDA bee data obtained thru:
www.nass.usda.gov
https://usda.library.cornell.edu/concern/publications/rn301137d?locale=en
https://www.kaggle.com/ellies15/bee-colony-data-cleaning-usda-data