Modelling The Negative Income Tax Experiments

Luke Swanson

Overview

The experiments

NIT experiments were conducted in the late 60's early 70's to test a brand new model for welfare.

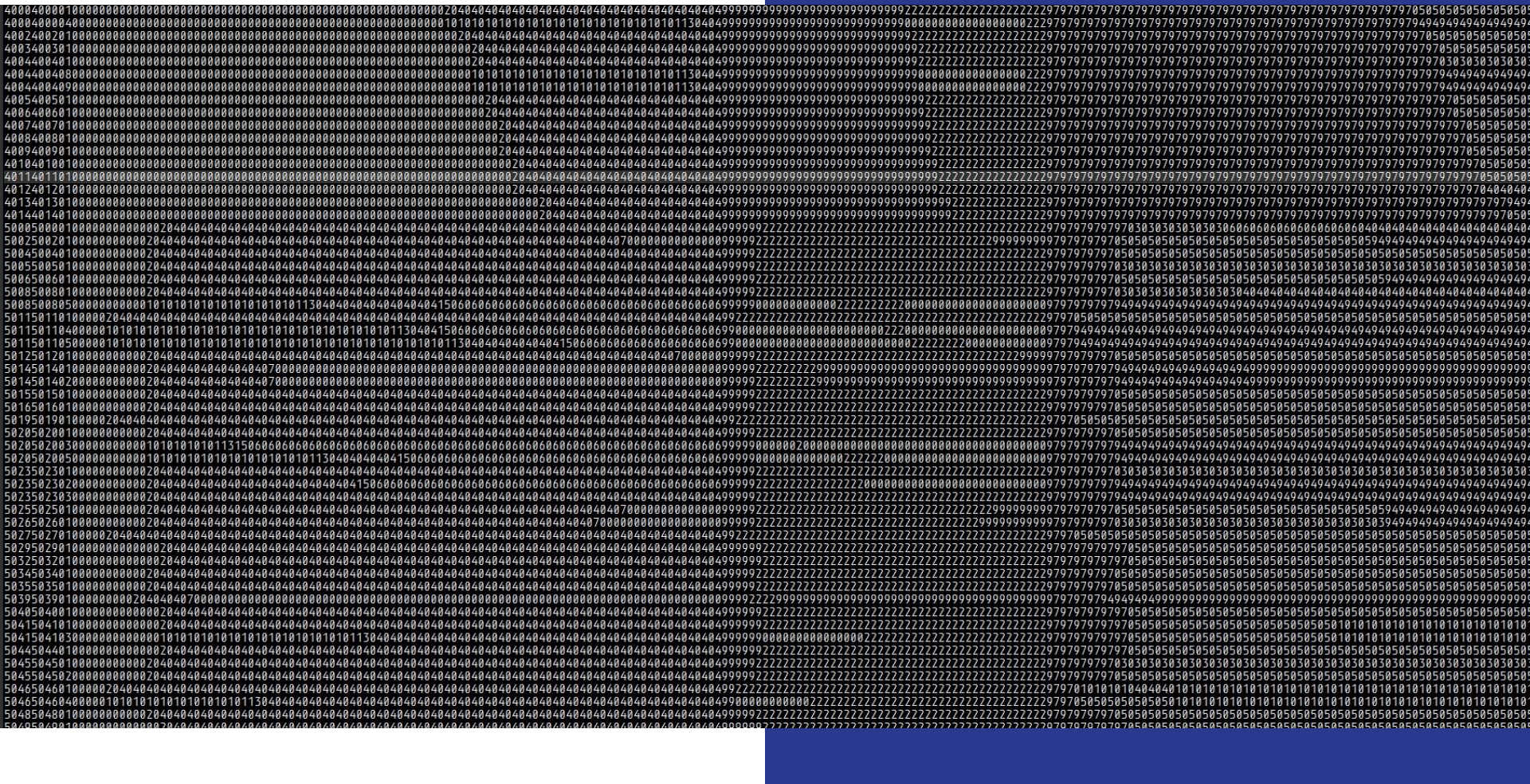
Context

They were largely regarded as a failure.

- A negative income tax is called a universal basic income today

The Goal

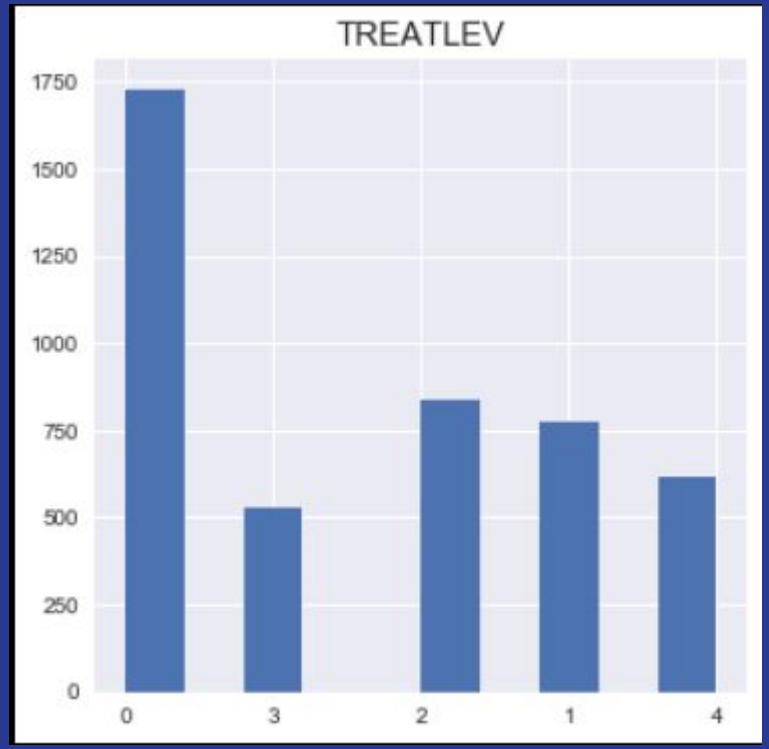
Build a supervised model to predict employment status of NIT recipients.



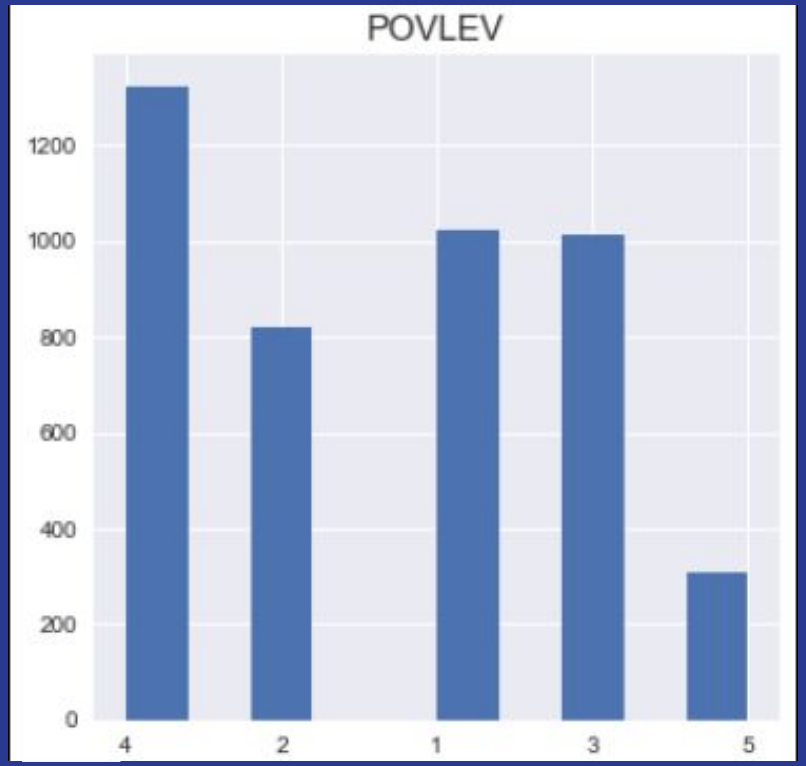
RECORD FORMAT DESCRIPTION FOR THE
GARYFILE PERSON RECORD

VARIABLE NUMBER	VARIABLE NAME	FIELD POSITION	LENGTH	VARIABLE DESCRIPTION
			DEMOGRAPHIC VARIABLES	
P0001	FAMNUM	1 - 4	4	FAMILY NUMBER
P0002	PERNUM	5 - 10	6	PERSON NUMBER
P0003- P0050	STATUS1- STATUS48	11 - 106	48 months x 2	PERSON STATUS CODE BY MONTH 00 = Family not active 01 = Family active, person not yet arrived 02 = Month person arrived, because family became active n3 = Month person arrived in already active family 13 = first arrival 23 = second arrival n3 = nth arrival 04 = Continued presence in family n5 = Month person left family 15 = first departure n5 = nth departure 06 = Person already left 07 = Month person left because family ended
P0051- P0098	MOPRES1- MOPRES48	107 - 154	48 months x 1	MONTHLY PRESENCE INDICATOR 0 = Family exists but person not there 1 = Birth 2 = Present in family 3 = Death 9 = Family not yet enrolled or famil[illegible]crited

Treatment Levels



Poverty Levels

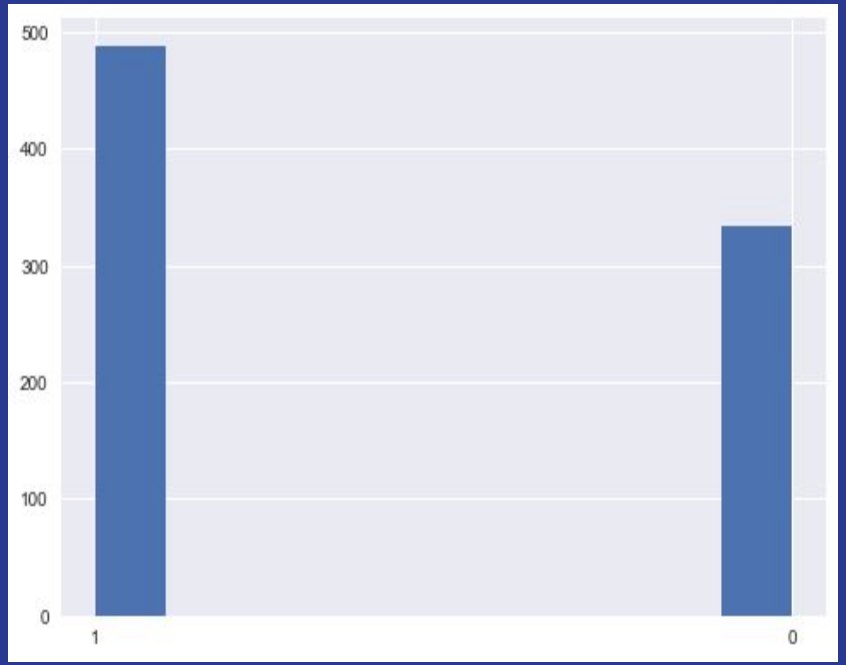


Class balance

Y

Class balance

y_test



The Models

DUMMY CLASSIFIER

	precision	recall	f1-score	support
0	0.00	0.00	0.00	334
1	0.59	1.00	0.75	488
accuracy			0.59	822
macro avg	0.30	0.50	0.37	822
weighted avg	0.35	0.59	0.44	822

LOGISTIC REGRESSION

	precision	recall	f1-score	support
Unemp	0.00	0.00	0.00	334
Emp	0.59	1.00	0.75	488
accuracy			0.59	822
macro avg	0.30	0.50	0.37	822
weighted avg	0.35	0.59	0.44	822

RANDOM FOREST

	precision	recall	f1-score	support
Unemp	0.00	0.00	0.00	334
Emp	0.59	1.00	0.75	488
accuracy			0.59	822
macro avg	0.30	0.50	0.37	822
weighted avg	0.35	0.59	0.44	822

GRADIENT BOOST

	precision	recall	f1-score	support
Unemp	0.51	0.06	0.11	334
Emp	0.60	0.96	0.74	488
accuracy			0.59	822
macro avg	0.56	0.51	0.42	822
weighted avg	0.56	0.59	0.48	822

Conclusions

-> Across all models, employment numbers suggest that there is no such disincentive to work.
-> Gradient boost was the best model in terms of weighted f-1 score average.
-> The model of choice depends on the importance of error.

Further Considerations

->This is time-series data.
->There were many variables left unexplored due to time constraints.
->There are four other cities in the study.

Proposal

-> for a better analysis:

+ Variables are grouped 1-48, 1-43, 1-42, 1-9
+ Create DataFrames for each group using PERNUM as primary key
+ Impute using ffil
+ Merge together to get more-complete data
+ Analyze