

Project 1



COMPARATIVE ANALYSIS OF OHIO GRADUATION RATES AND SELECT SOCIAL ECONOMIC DATA, 2002 - 2018

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Outline

- Introduction/Objective
- Tasks
 - Cleaning data sets
 - Merging data sets
 - Visualizing the data
 - Statistical analysis
- Results and discussion
- Conclusions

Objective

Investigation of the relationships between the college graduation rate, family income and poverty rate in the state of Ohio using the following Python Libraries:

```
#Cleaning data although degree data is relatively clean with pandas
import pandas as pd
import matplotlib.pyplot as plt
import sklearn.datasets as dta
import scipy.stats as st
import numpy as np
from scipy.stats import linregress
```

Sources of Data

Three data sets were obtained, merged and cleaned in the Jupyter notebook with Pandas library:

1. Median Income and Unemployment data was obtained from the USDA online: (<https://www.ers.usda.gov/data-products/county-level-data-sets/download-data/>)
2. Ohio College Graduation data was obtained from the Ohio Department of Higher Education: (<https://www.ohiohighered.org/data-reports/degrees>)
3. Poverty rate data was obtained from the US Census bureau: (https://www.census.gov/data-tools/demo/saipe/#/?map_geoSelector=aa_c&s_state=39&s_year=2019,2018&s_measures=aa_snc&map_yearSelector=2018)

Initial thoughts on data

- We did not expect to be such a large correlation between median income and number of degrees earned.
- No expected correlation between poverty rate and degrees earned.
- As degrees earned rises, the unemployment rate goes down.

Unemployment and Median Income Data Set

Unemployment and median household income for the United States, States, and counties, 2000-20									
Sources: Unemployment: U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics (LAUS); median household income: U.S. Department of Commerce, Bureau of the Census, Small Area Income and Median Household Income (SAHMI). For definitions of rural classifications, see the USDA, Economic Research Service webpage "Rural Classifications" in the "Rural Economy & Population" topic. Variable descriptions (column names) are found in the second tab in this v									
This table was prepared by USDA, Economic Research Service. Data as of June 2, 2021. Contact: Kathleen Kassel.									
FIPS_Co	State	Area_name	Rural_urban_continuum_code_2013	Urban_influence_code_2013	Metro_2013	Civilian_labor_force_2013	Employed_2000	Unemployed_2000	
39000	OH	Ohio				5,781,442	5,544,340	237,102	
39001	OH	Adams County, OH	6	4	0	12,554	11,594	960	
39003	OH	Allen County, OH	3	2	1	51,480	49,043	2,437	
39005	OH	Ashland County, OH	4	3	0	27,040	25,881	1,159	
39007	OH	Ashtabula County, OH	4	3	0	50,443	47,811	2,632	
39009	OH	Athens County, OH	4	3	0	27,718	26,149	1,569	
39011	OH	Auglaize County, OH	4	5	0	25,081	24,169	912	
39013	OH	Belmont County, OH	3	2	1	31,012	28,968	2,044	
39015	OH	Brown County, OH	1	1	1	20,613	19,474	1,139	
39017	OH	Butler County, OH	1	1	1	173,019	166,346	6,673	
39019	OH	Carroll County, OH	2	2	1	14,140	13,474	666	
39021	OH	Champaign County, OH	6	3	0	20,477	19,686	791	
39023	OH	Clark County, OH	3	2	1	72,210	68,840	3,370	
39025	OH	Clermont County, OH	1	1	1	95,185	91,442	3,743	
39027	OH	Clinton County, OH	6	3	0	21,848	21,010	838	
39029	OH	Columbiana County, OH	4	3	0	54,229	51,414	2,815	
39031	OH	Coshocton County, OH	6	3	0	18,190	17,342	848	
39033	OH	Crawford County, OH	4	3	0	23,451	22,362	1,089	
39035	OH	Cuyahoga County, OH	1	1	1	685,192	664,774	20,418	
39037	OH	Darke County, OH	6	5	0	27,823	26,629	1,194	

Poverty Data Set

Year	State	County ID	State / County Name	All Ages SAIPE Poverty Universe	All Ages in Poverty Count	All Ages in Poverty Count LB 90%	All Ages in Poverty Count UB 90%	90% Confidence Interval (All Ages)
2019	0	0	United States	320,118,791	39,490,096	39,248,096	39,732,096	39,248,096 to 39,732,096
2018	0	0	United States	319,184,033	41,852,315	41,619,366	42,085,264	41,619,366 to 42,085,264
2017	0	0	United States	317,741,588	42,583,651	42,342,619	42,824,683	42,342,619 to 42,824,683
2016	0	0	United States	315,165,470	44,268,996	44,022,086	44,515,906	44,022,086 to 44,515,906
2015	0	0	United States	313,476,400	46,153,077	45,878,016	46,428,138	45,878,016 to 46,428,138
2014	0	0	United States	310,899,910	48,208,387	47,966,830	48,449,944	47,966,830 to 48,449,944
2013	0	0	United States	308,196,783	48,810,868	48,554,692	49,067,044	48,554,692 to 49,067,044
2012	0	0	United States	306,086,063	48,760,123	48,528,543	48,991,703	48,528,543 to 48,991,703
2011	0	0	United States	303,778,193	48,452,035	48,217,869	48,686,201	48,217,869 to 48,686,201
2010	0	0	United States	301,535,021	46,215,956	45,975,650	46,456,262	45,975,650 to 46,456,262
2009	0	0	United States	299,026,555	42,868,163	42,631,574	43,104,752	42,631,574 to 43,104,752
2008	0	0	United States	296,184,480	39,108,422	38,858,742	39,358,102	38,858,742 to 39,358,102
2007	0	0	United States	293,744,043	38,052,247	37,829,283	38,275,211	37,829,283 to 38,275,211
2006	0	0	United States	291,531,091	38,757,253	38,535,015	38,979,491	38,535,015 to 38,979,491
2005	0	0	United States	287,270,432	38,231,474	37,934,924	38,528,024	37,934,924 to 38,528,024
2004	0	0	United States	290,616,537	37,039,804	36,359,662	37,719,946	36,359,662 to 37,719,946
2003	0	0	United States	287,699,184	35,861,170	35,190,401	36,531,939	35,190,401 to 36,531,939
2002	0	0	United States	285,317,346	34,569,951	33,912,173	35,227,729	33,912,173 to 35,227,729
2019	39	39000	Ohio	11,362,381	1,474,285	1,449,452	1,499,118	1,449,452 to 1,499,118
2018	39	39000	Ohio	11,362,293	1,568,586	1,542,309	1,594,863	1,542,309 to 1,594,863
2017	39	39000	Ohio	11,330,717	1,575,401	1,551,281	1,599,521	1,551,281 to 1,599,521
2016	39	39000	Ohio	11,287,358	1,639,636	1,614,177	1,665,095	1,614,177 to 1,665,095
2015	39	39000	Ohio	11,295,380	1,670,487	1,646,455	1,694,519	1,646,455 to 1,694,519
2014	39	39000	Ohio	11,276,366	1,778,288	1,755,728	1,800,848	1,755,728 to 1,800,848
2013	39	39000	Ohio	11,248,737	1,793,523	1,767,288	1,819,758	1,767,288 to 1,819,758
2012	39	39000	Ohio	11,227,437	1,818,886	1,797,356	1,840,416	1,797,356 to 1,840,416
2011	39	39000	Ohio	11,221,261	1,835,282	1,811,265	1,859,299	1,811,265 to 1,859,299

2002 - 2019 Ohio Poverty - Medi



College Graduation Data Set

Sector	Institution	Discipline Area	Subject Field	Level of Degree or Certificate	Awards in FY 2002	Awards in FY 2003
Community Colleges	Belmont Technical College	Arts & Humanities	Liberal and General Studies	Associate Degree	0	0
Community Colleges	Belmont Technical College	Business	Accounting	Associate Degree	8	16
Community Colleges	Belmont Technical College	Business	Accounting	Less than One-Year Award	0	0
Community Colleges	Belmont Technical College	Business	Accounting	One to less than Two-Year Award	2	2
Community Colleges	Belmont Technical College	Business	Administrative and Secretarial	Associate Degree	3	3
Community Colleges	Belmont Technical College	Business	Administrative and Secretarial	Less than One-Year Award	0	0
Community Colleges	Belmont Technical College	Business	Business, Other	Associate Degree	0	0
Community Colleges	Belmont Technical College	Business	Computer and Quantitative Business Fields	Associate Degree	23	12
Community Colleges	Belmont Technical College	Business	Computer and Quantitative Business Fields	One to less than Two-Year Award	5	0
Community Colleges	Belmont Technical College	Business	Management	Associate Degree	17	30
Community Colleges	Belmont Technical College	Business	Management	Less than One-Year Award	0	0
Community Colleges	Belmont Technical College	Business	Management	One to less than Two-Year Award	2	0
Community Colleges	Belmont Technical College	Business	Service Business	Associate Degree	2	1
Community Colleges	Belmont Technical College	Business	Service Business	Less than One-Year Award	0	0
Community Colleges	Belmont Technical College	Business	Service Business	One to less than Two-Year Award	0	1
Community Colleges	Belmont Technical College	Education	Library Science	Associate Degree	0	0
Community Colleges	Belmont Technical College	Engineering	CAD/CADD Drafting	Associate Degree	1	0
Community Colleges	Belmont Technical College	Engineering	Construction, Civil Engineering, Architecture Technology	Associate Degree	28	23

Sector	Institution	Discipline Area	Subject Field
Community Colleges	Belmont Technical College	Arts & Humanities	Liberal and General Studies
Community Colleges	Belmont Technical College	Arts & Humanities	Liberal and General Studies
Community Colleges	Belmont Technical College	Business	Management
Community Colleges	Belmont Technical College	Business	Accounting
Community Colleges	Belmont Technical College	Business	Accounting
Community Colleges	Belmont Technical College	Business	Accounting
Community Colleges	Belmont Technical College	Business	Accounting
Community Colleges	Belmont Technical College	Business	Accounting
Community Colleges	Belmont Technical College	Business	Administrative and Secretarial
Community Colleges	Belmont Technical College	Business	Administrative and Secretarial
Community Colleges	Belmont Technical College	Business	Business, Other
Community Colleges	Belmont Technical College	Business	Marketing
Community Colleges	Belmont Technical College	Business	Service Business
Community Colleges	Belmont Technical College	Education	Elementary and Early Education
Community Colleges	Belmont Technical College	Education	Education, Other
Community Colleges	Belmont Technical College	Education	Library Science
Community Colleges	Belmont Technical College	Engineering	Construction, Civil Engineering, Architecture Technology
Community Colleges	Belmont Technical College	Engineering	Construction, Civil Engineering, Architecture Technology
Community Colleges	Belmont Technical College	Engineering	Construction, Civil Engineering, Architecture Technology
Community Colleges	Belmont Technical College	Engineering	Electrical Engineering Technology

Data Import and Cleaning

- Imported all data sets for cleaning
- Renaming columns in all data sets to be more meaningful to analysis
- Dropping columns to only use relevant data to analysis
- Adding summary columns for total degrees
- Adding average unemployment rate for the states and separating for Ohio only

Sample Code:

```
df = df.drop (columns=["Subject Field"])  
df
```

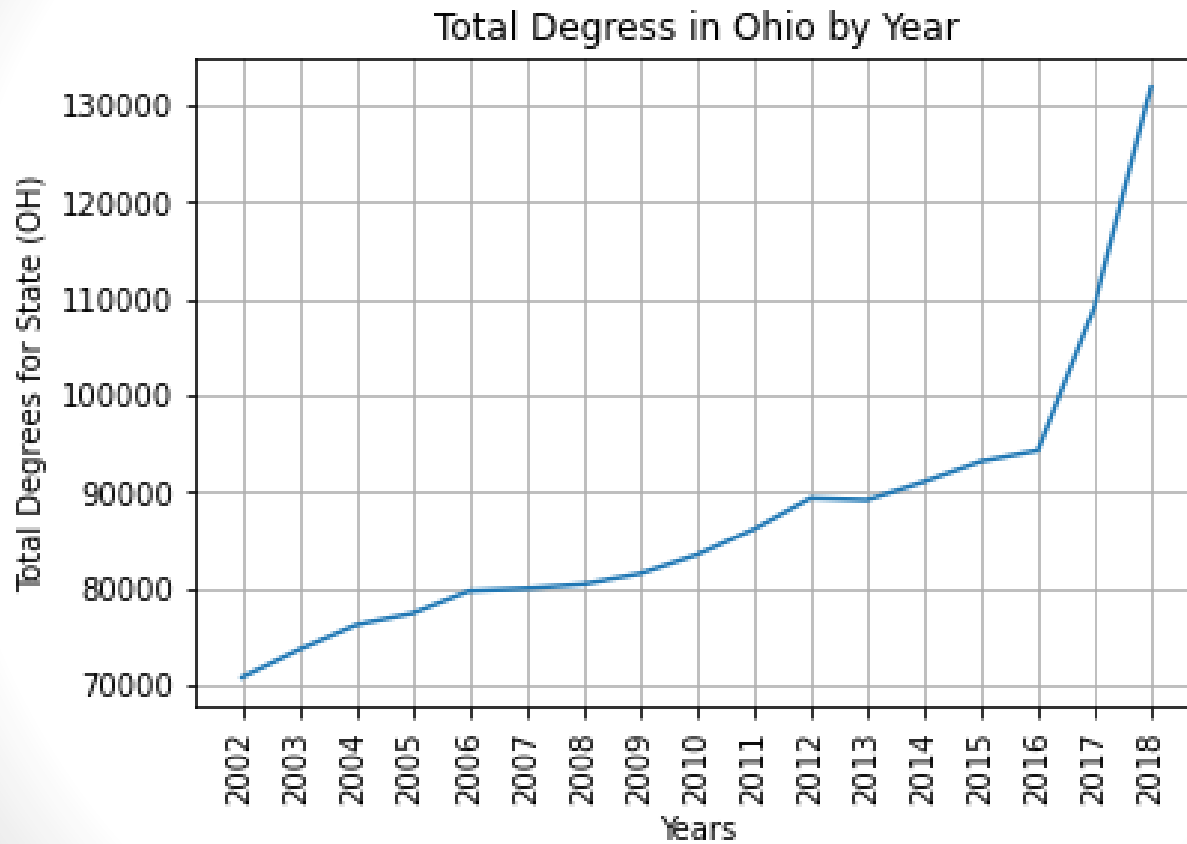
```
df["Level of Degree or Certificate"].value_counts()
```

```
df = df.dropna(how="all")  
df.head()
```

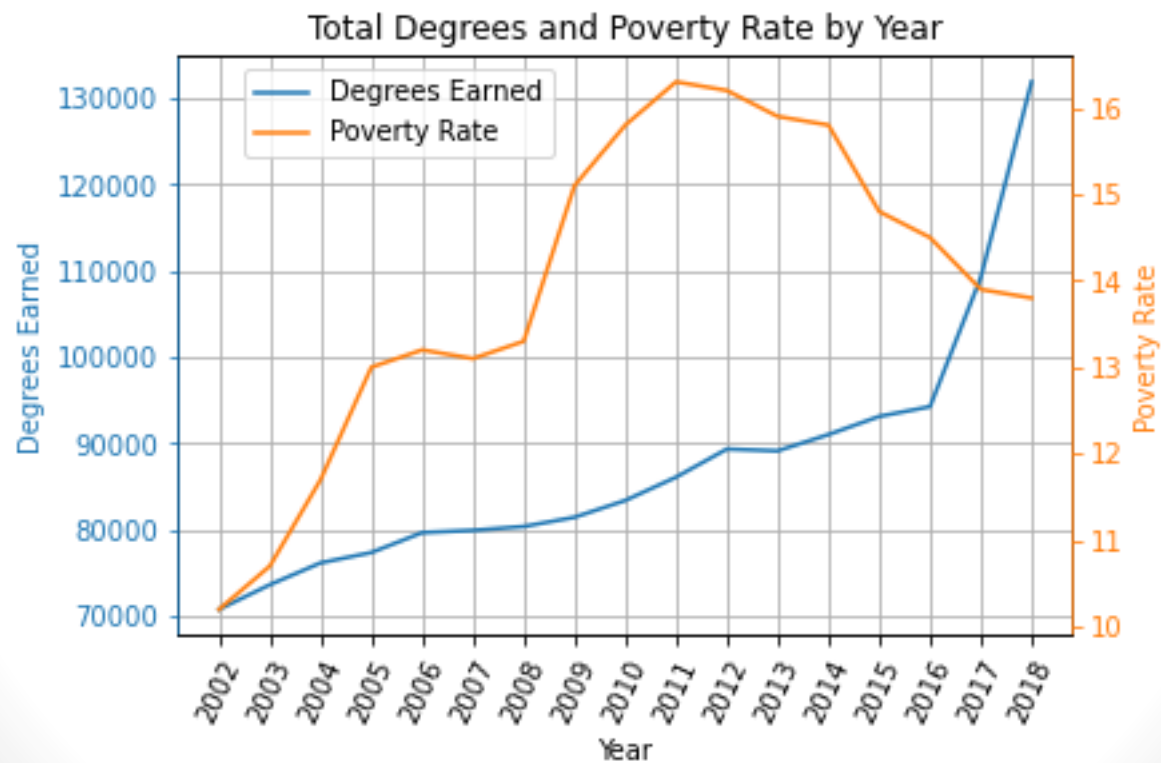
```
df = df.reset_index(drop=True)  
df.loc['Total'] = df.sum()
```

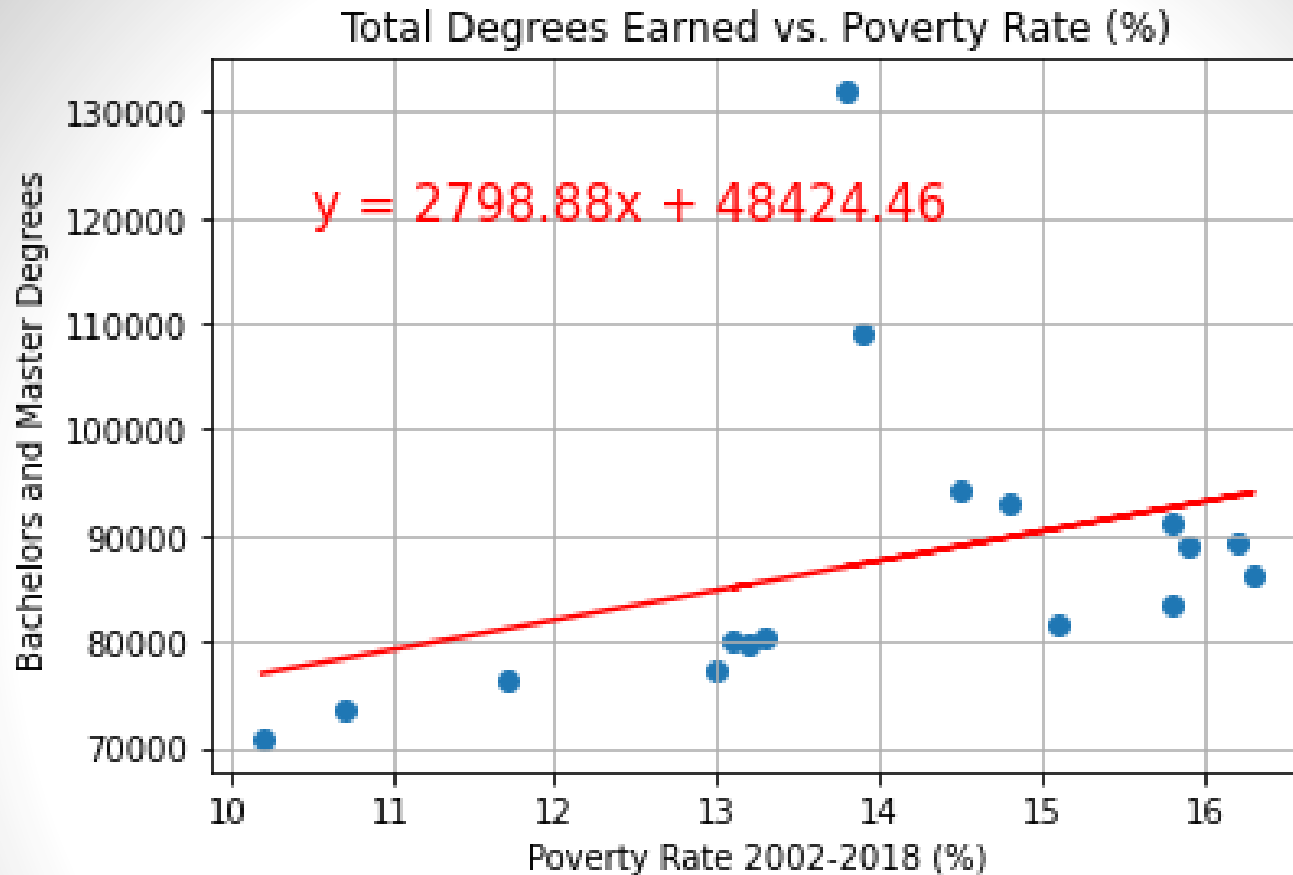
```
df["Total Degrees"] = df.sum(axis= 1)  
df
```

Total Degrees Data Observations – by Year



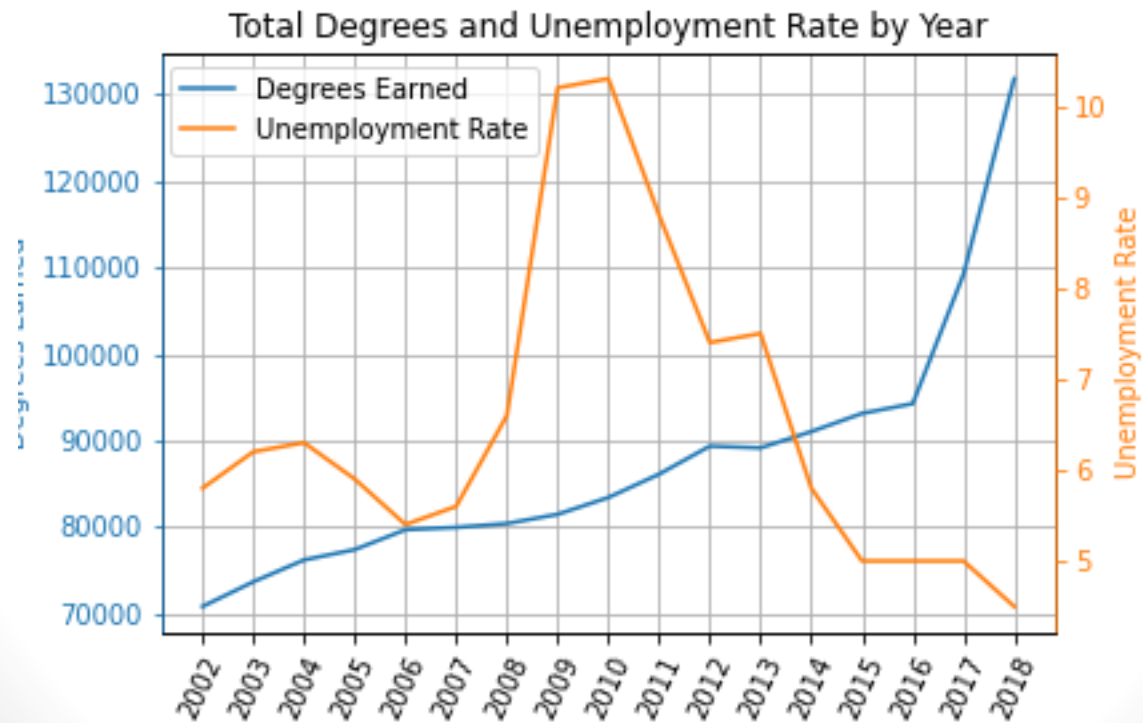
Question 1: Does the poverty rate have an impact on the number of degrees from 2002-2018 in Ohio earned?

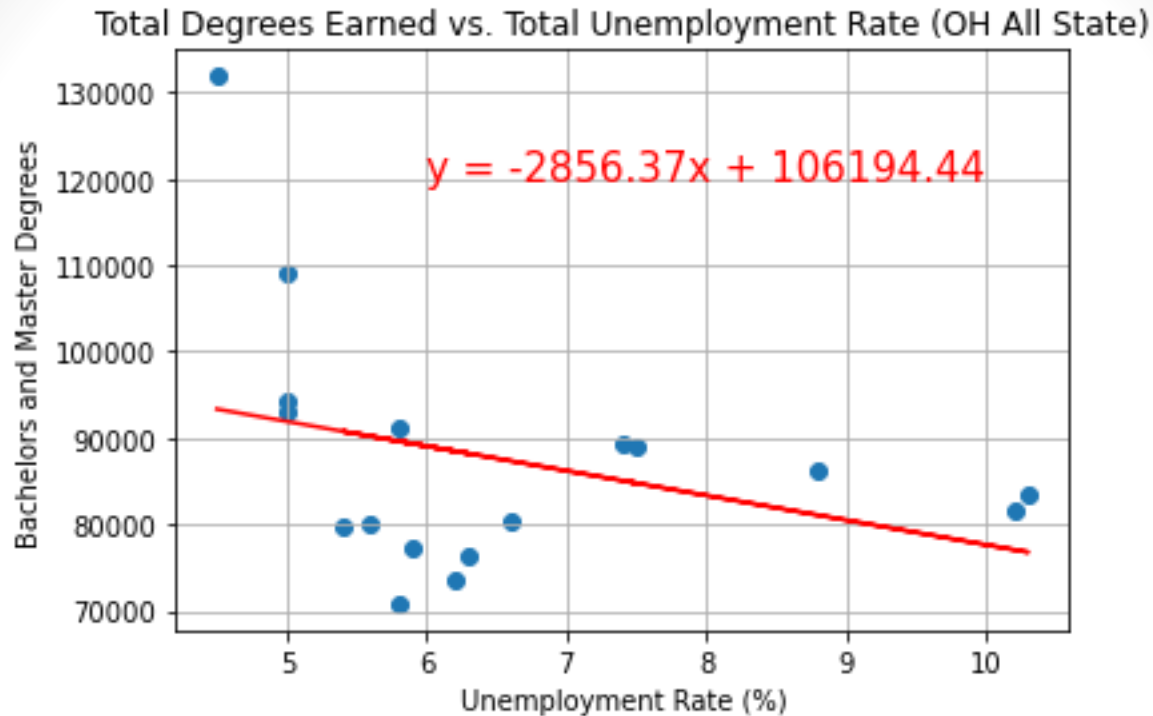




Throughout our analysis there seemed to be a slight correlation between the states poverty rate and the number of degrees earned. Perhaps, as poverty rose, less people were attending school. The correlation was calculated at 0.36, again, suggesting a slight correlation.

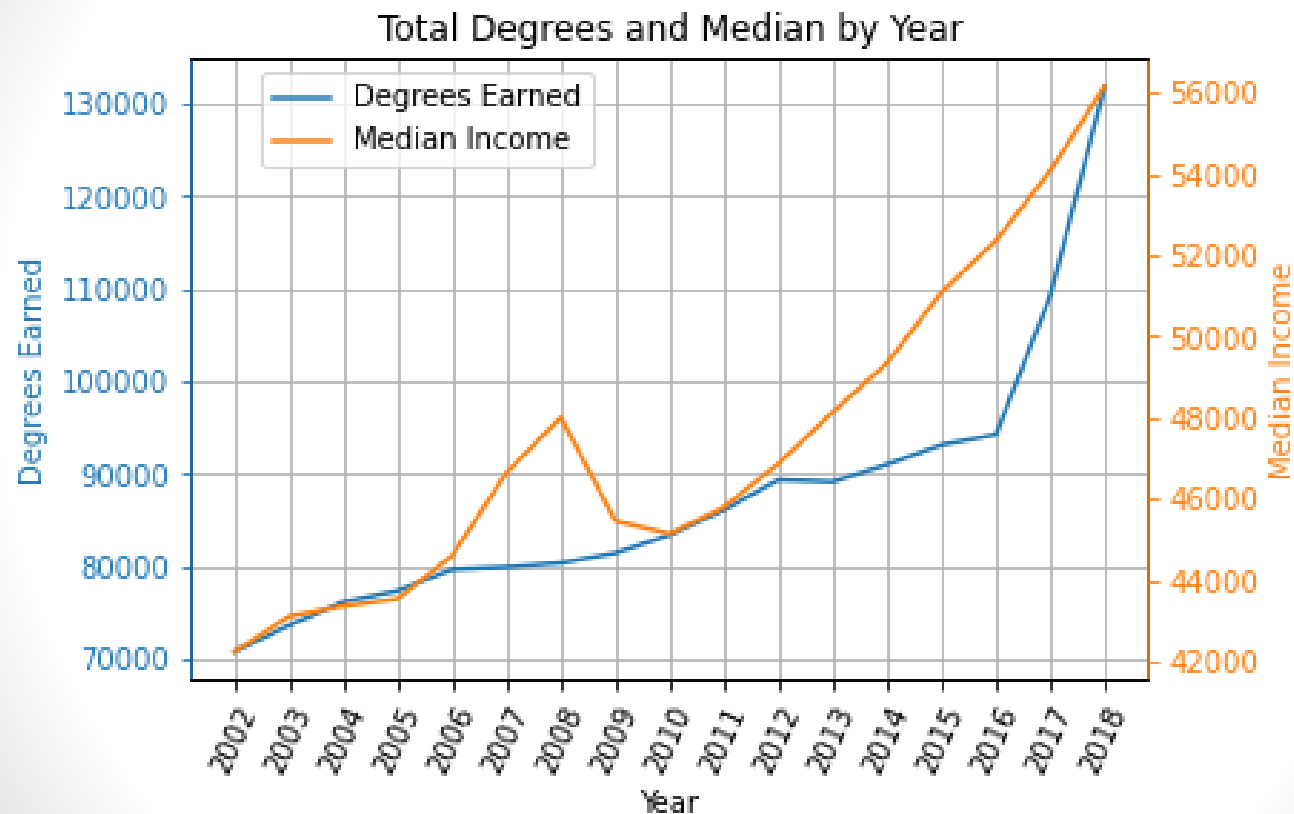
Question 2: Did Ohio's unemployment rate have an impact on the number of degrees earned from 2002-2018?



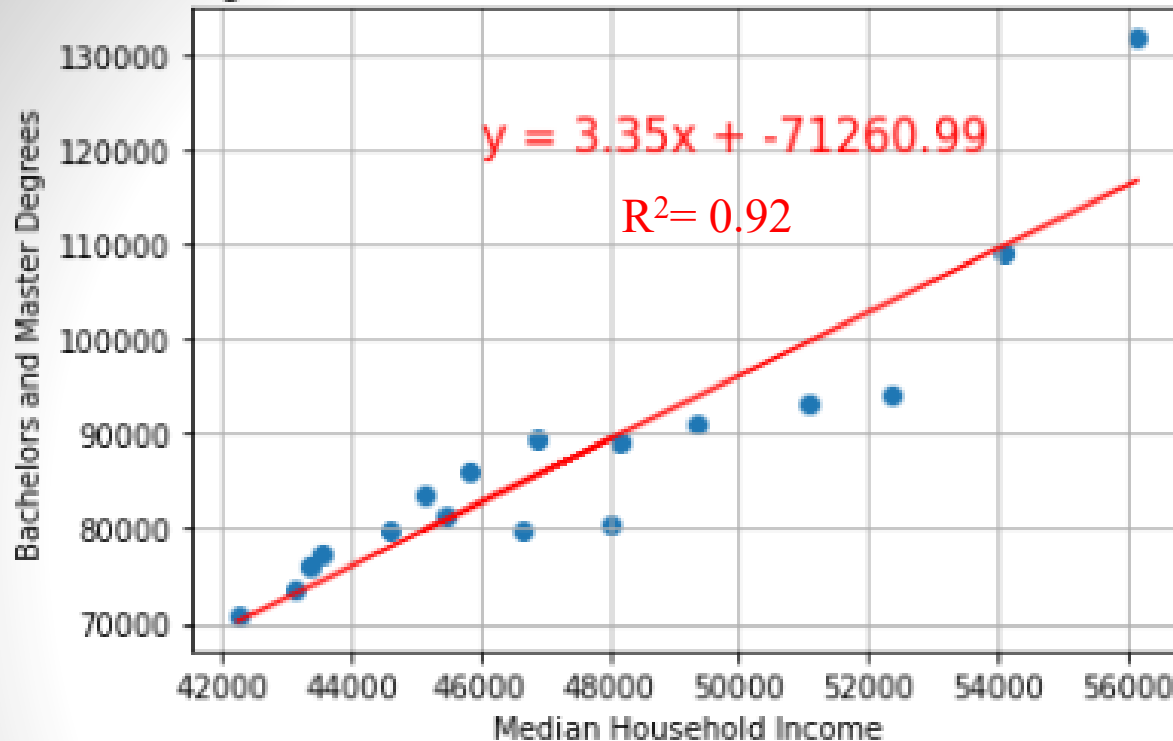


After the analysis was completed, there was no correlation between the unemployment rate and the number of degrees earned. This metric had the lowest correlation of all our calculations. The correlation was calculated at -0.34. Although there looks like there could be a correlation in certain years, the overall data tells a different story.

Question 3: Did the median income from 2002-2018 impact the number of degrees obtained?

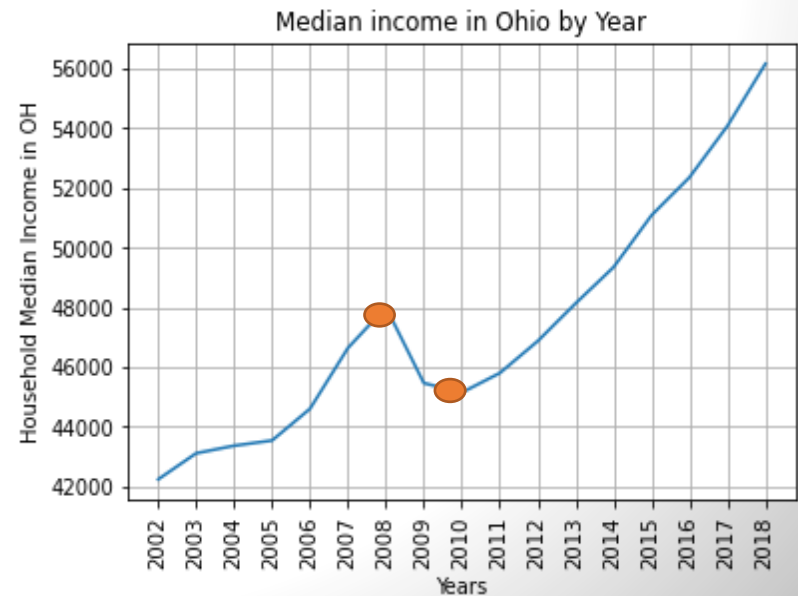
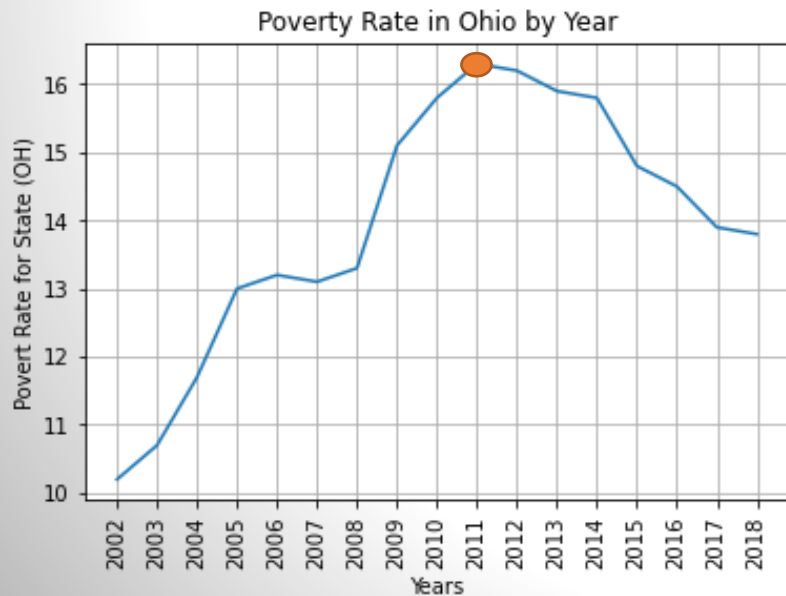
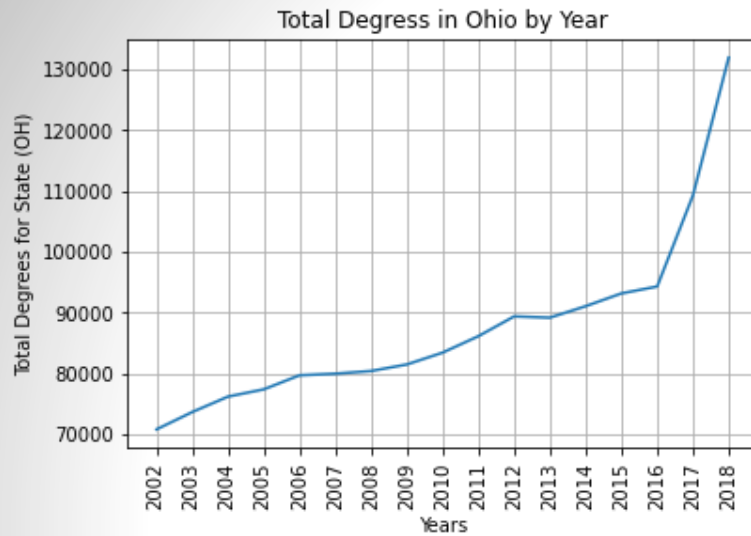


Total Degrees Earned vs. Ohio Median Household Income 2002-2018



- Out of all three correlation comparisons, this one was the most surprising. There is a significant correlation between the median income and the number of degrees earned.
- The data suggests that the higher the median income the more likely there are going to be college graduates that year.

Data Summary – by Year



Summary & Conclusions

- Median Income, Unemployment data, poverty rates and Ohio College graduation data were obtained from 4 different resources
- Data were imported, cleaned and combined in Jupiter notebook with the aid of Pandas data frames
- Number of college graduates with bachelors and master's degrees increased steadily and almost doubled in 2018 compared to 2002
- Unemployment was highest during 2009 -2010 (during and right after great recession years)
- Poverty Rates were the highest during 2010-2013
- Median Household income decreased during 2008-2011 and started increasing 2011
- Significant correlation was observed between number of degrees obtained and Median Household income

Thank you for your attention!

