



Socioeconomics of College Education Throughout the Years

Analyzing the Return on Education

Project 1 Group 1:

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Brendan Golden

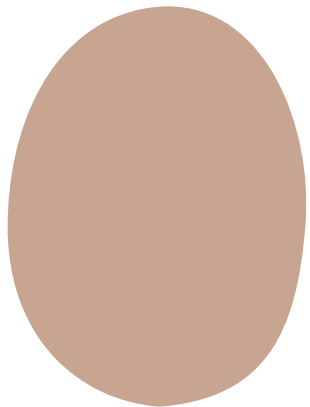
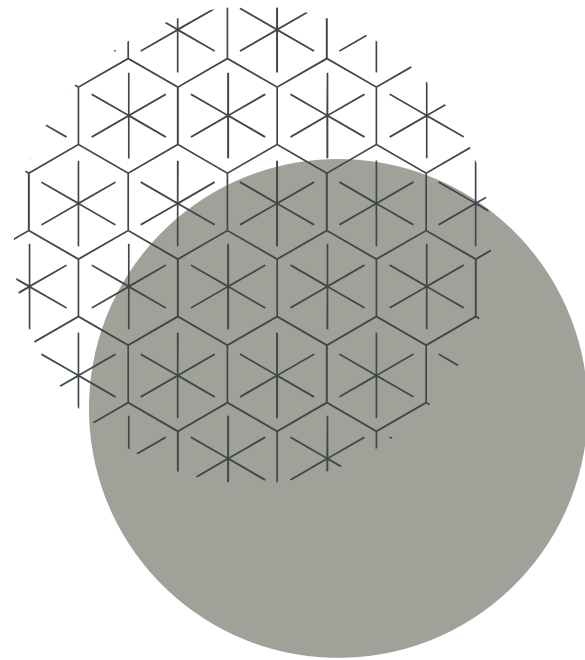
Wei Wang

Chris Rahal



Title

Summary



Analysis Questions

Which Ethnic Groups
Obtained the Most
Degrees?

Which Gender Obtained the
Most Degrees?

Gender Enrollment Across
Different Majors?

Average Salaries Across
Majors?

Number of Graduates per
Major?

Which majors have the Highest
and Lowest Mean Salary?

Distribution of Degrees for
each Educational Level?

Do Socioeconomic Factors
Affect Mean Salary?

Is there a Correlation between
Number of Degrees and
Salary?

Has Tuition Increased along
with Salary?



+55.81%

Increase in average salary from 1995
to 2015

+39.52%

Increase Total Tuition Cost from 1995
to 2015

+174,000

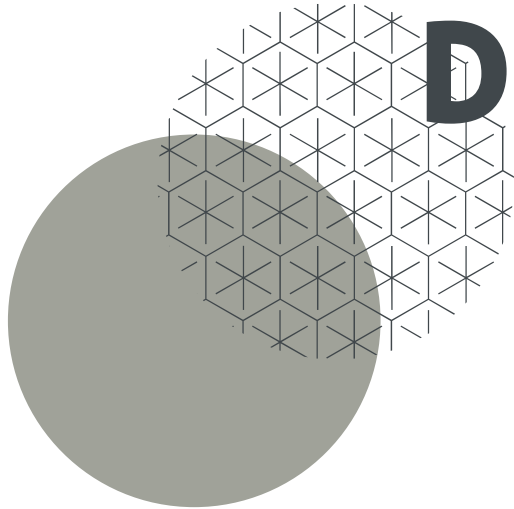
Average Difference between Male and
Female Graduates over the Years

Project Visualizations

Educational Industry		
Choosing Majors	Highest Return on Investment	Most Inelastic Majors Across the Time Period
	Average Salary per Major	Average Aggregate Salary
Average Salary	Major Distribution Over Time	Ethnic and Gender Distribution per Educational Major
	Tuition and Salary Increases from 1995–2015	Associated Percent Change in Tuition vs Salary
Educational Distribution		
Cost of Tuition vs. Salary		

Title

Data Cleaning



Data Cleaning



Find The Data

Search the web for
education based data
sources



Pick The Data

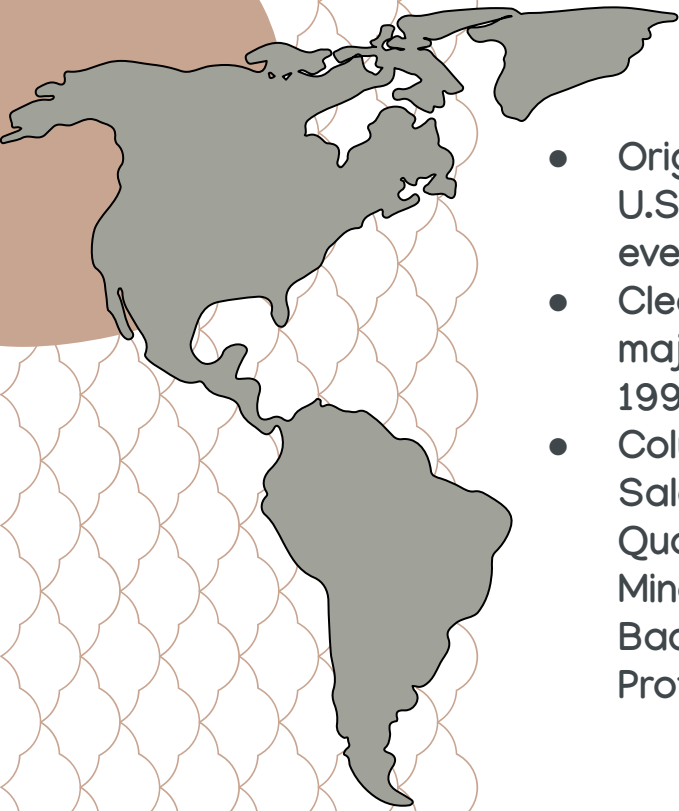
National Survey of Recent
College Graduates
&
National Center for
Education Statistics



Clean The Data

Sort the data according to
the information you're
looking for

Data Cleaning: Graduation Data



- Original graduate data set surveyed the U.S. recent graduates from 1993 to 2015 every two years.
- Cleaned up data frame to specific majors which remained consistent from 1995 to 2015.
- Columns: Year, Demographics Total, Salary Mean, Salary Median, Salary Quantity, Ethnicity Asian, Ethnicity Minority, Ethnicity White, Male, Female, Bachelors, Doctorate, Masters, and Professional degree.

Source: <https://www.kaggle.com/datasets/mexwell/us-graduates>

Data Cleaning: Tuition Data

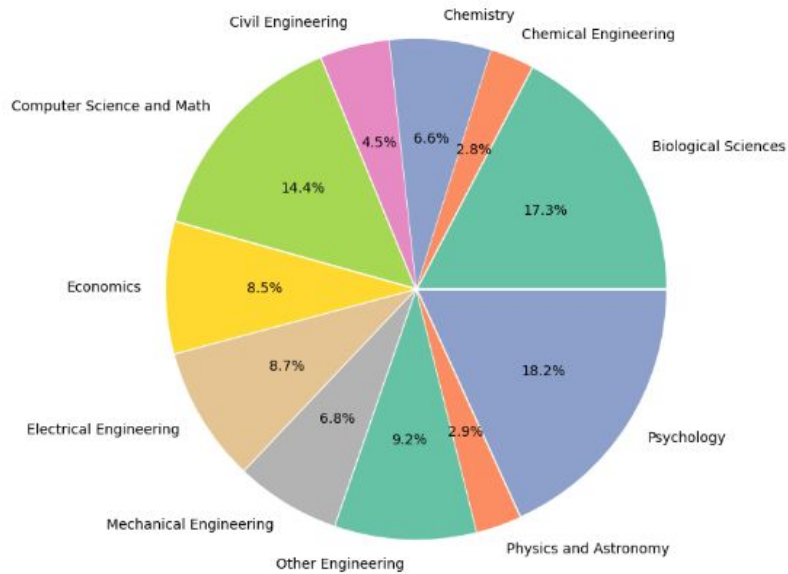


- National Center for Education Statistics are based on the U.S.
- Data goes as far back as 1968, the goal was to search their website and find a data set showing tuition cost.
- Data set found was not formatted properly for pandas so I edited it first to include years 1995 to 2015, Total Tuition Cost, Public Institutions, and Private Institutions.
- The total costs are based on all costs including fees, dorming, etc. and are per year cost.

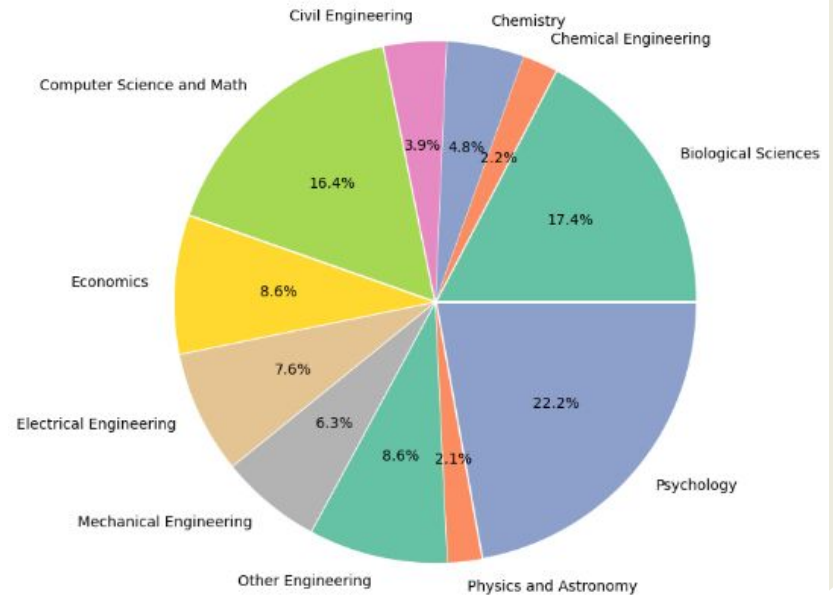
Source: https://nces.ed.gov/programs/digest/d17/tables/dt17_330.10.asp

Exploratory Analysis Example

Major Distribution in 1995

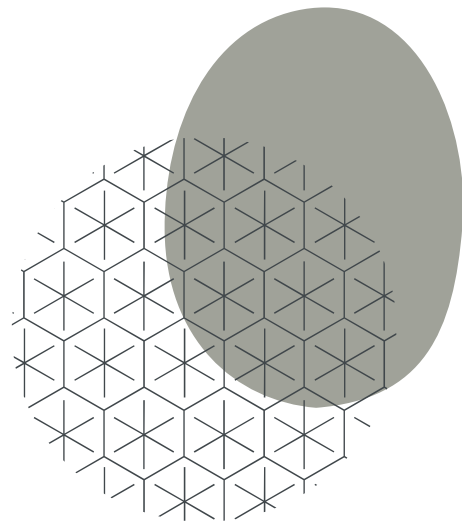


Major Distribution in 2015



Title

Approach



How'd We Do It?

- Imported: Pandas, Matplotlib, Seaborn, Scipy.Stats
- Pandas was used to read in our csv files and clean the data sets.
- Matplotlib allowed us to visualize the data and perform an exploratory analysis.
- Seaborn was for a better set of colors.
- Scipy.Stats was used for linear regressions and t-tests.

Importing packages into Jupyter Notebook

```
[194]: #Import packages into Jupyter Notebook
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import linregress
from scipy.stats import ttest_ind

#Ignore errors
import warnings
warnings.filterwarnings('ignore')
```

Issues

- Data set formatting
- Data types errors

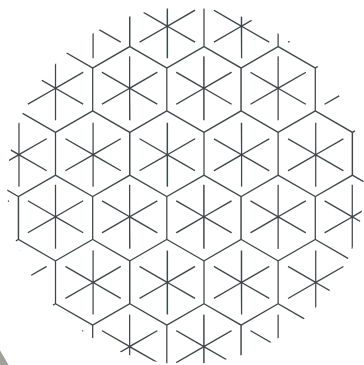
```
tuition_cost_df['Total tuition'] = tuition_cost_df['Total tuition'].replace({'\$: ': '', ',': ''}, regex=True).astype(int)
```

```
tuition_cost_df.dtypes
```

Table 330.10. Average undergraduate tuition and fees and room and board rates of Selected years, 1963-64 through 2016-17

Year and control of institution	Constant 2016-17 dollars\1\							
	Total tuition, fees, room, and board			Tuition and required fees\2\			Dormitory room and board	
	All institutions	4-year	2-year	All institutions	4-year	2-year	All institutions	4-year
	5	2	3	4	5	6	7	8
All institutions								
1963-64	\$9,818	\$10,119	\$6,101	\$3,999	\$4,348	\$1,347	\$2,221	\$2,192
1966-67	10,158	10,610	6,824	4,231	4,720	1,580	2,422	2,411
1967-68	10,097	10,612	7,020	4,192	4,728	1,656	2,440	2,434
1968-69	9,923	10,513	7,164	4,057	4,649	1,704	2,451	2,450
1969-70	10,021	10,756	6,998	4,144	4,850	1,589	2,500	2,517
1970-71	10,095	10,899	6,844	4,203	4,971	1,524	2,558	2,577
1971-72	10,204	11,072	6,910	4,268	5,103	1,479	2,624	2,644
1972-73	10,398	11,511	7,233	4,305	5,387	1,626	2,765	2,791
1973-74	9,904	10,915	7,070	4,141	5,124	1,709	2,578	2,602
1974-75	9,291	10,245	6,707	3,792	4,723	1,535	2,474	2,496
1975-76	9,203	10,303	6,447	3,628	4,695	1,300	2,489	2,521
1976-77	9,407	10,654	6,606	3,820	5,037	1,429	2,495	2,525

Year	Total tuition	Public Tuition	Private Tuition
1995	\$13,822	\$9,825	\$27,027
1996	\$14,057	\$9,971	\$27,546
1997	\$14,384	\$10,222	\$27,779
1998	\$14,859	\$10,481	\$28,563
1999	\$14,950	\$10,475	\$28,973
2000	\$14,995	\$10,514	\$29,621
2001	\$15,497	\$10,924	\$30,522
2002	\$16,008	\$11,328	\$31,101
2003	\$16,891	\$12,057	\$32,109



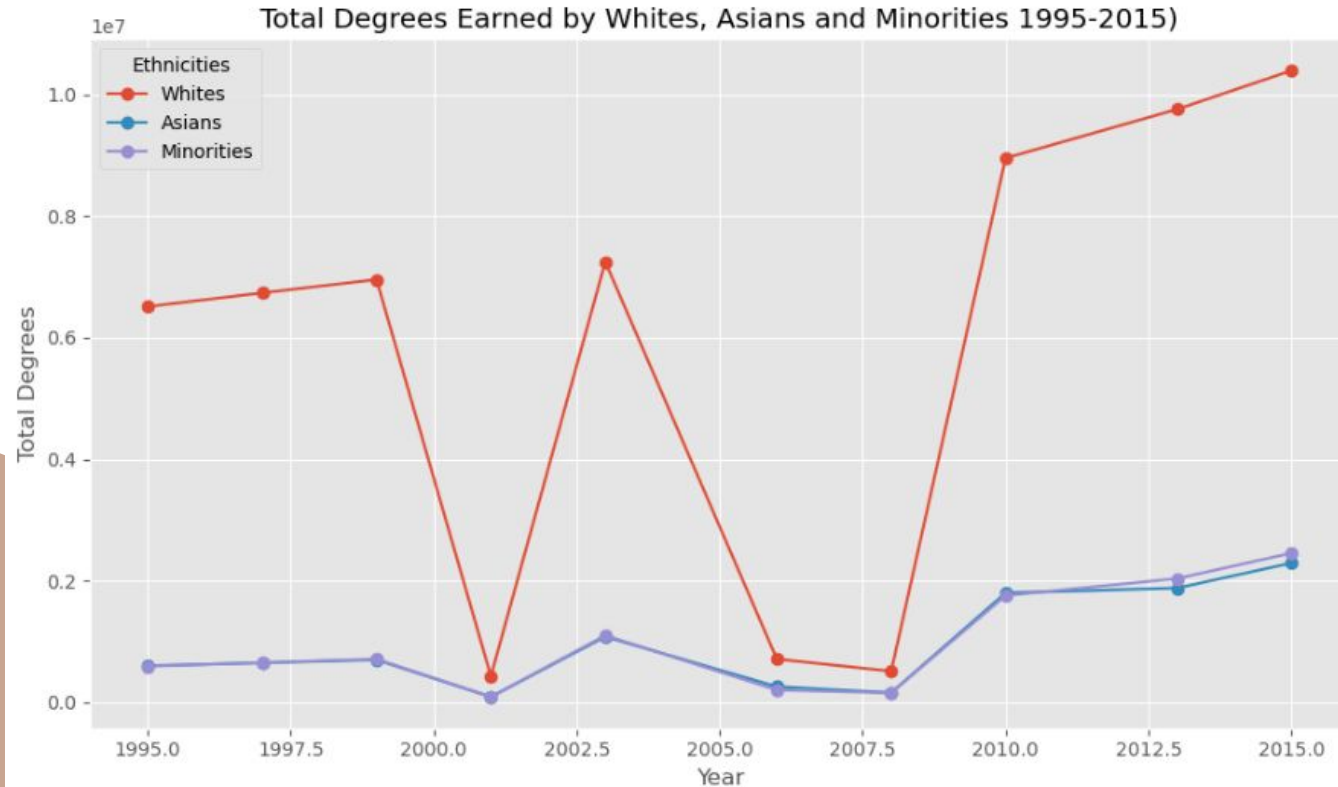
Conclusion



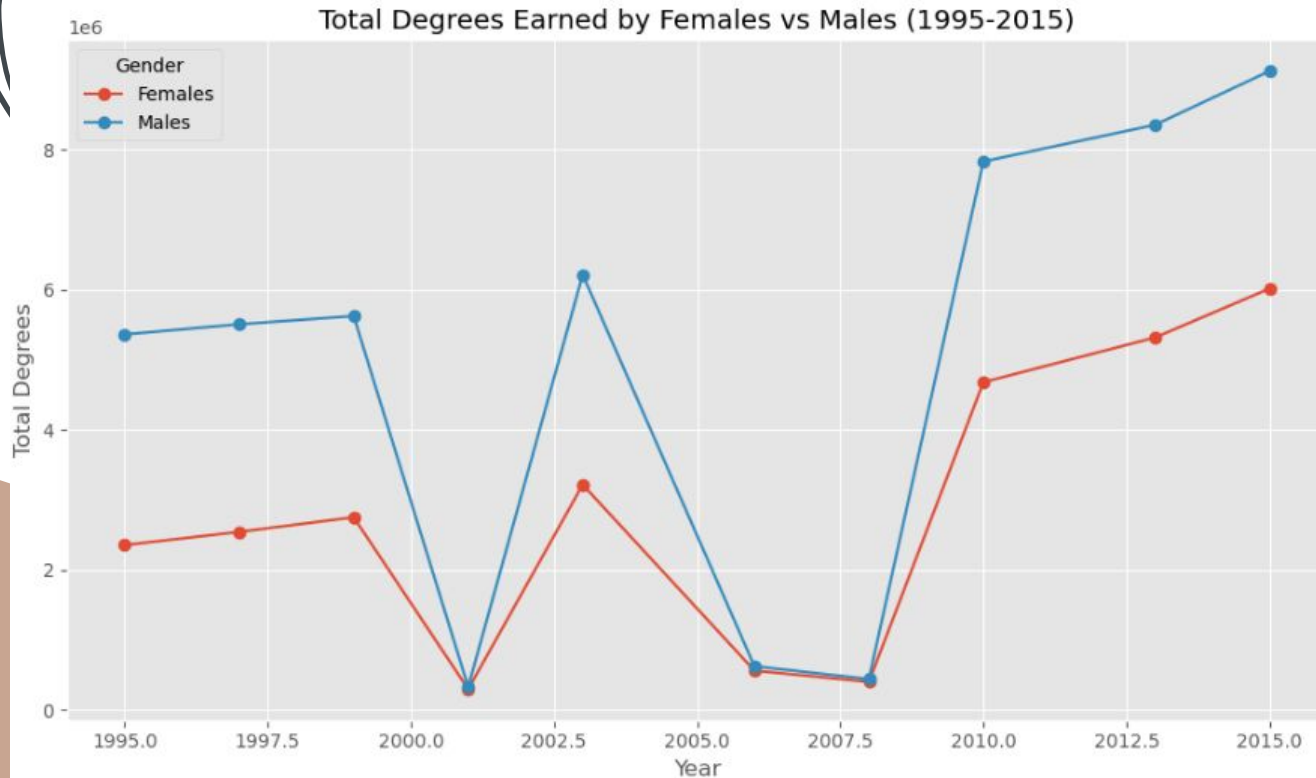
Data Visuals



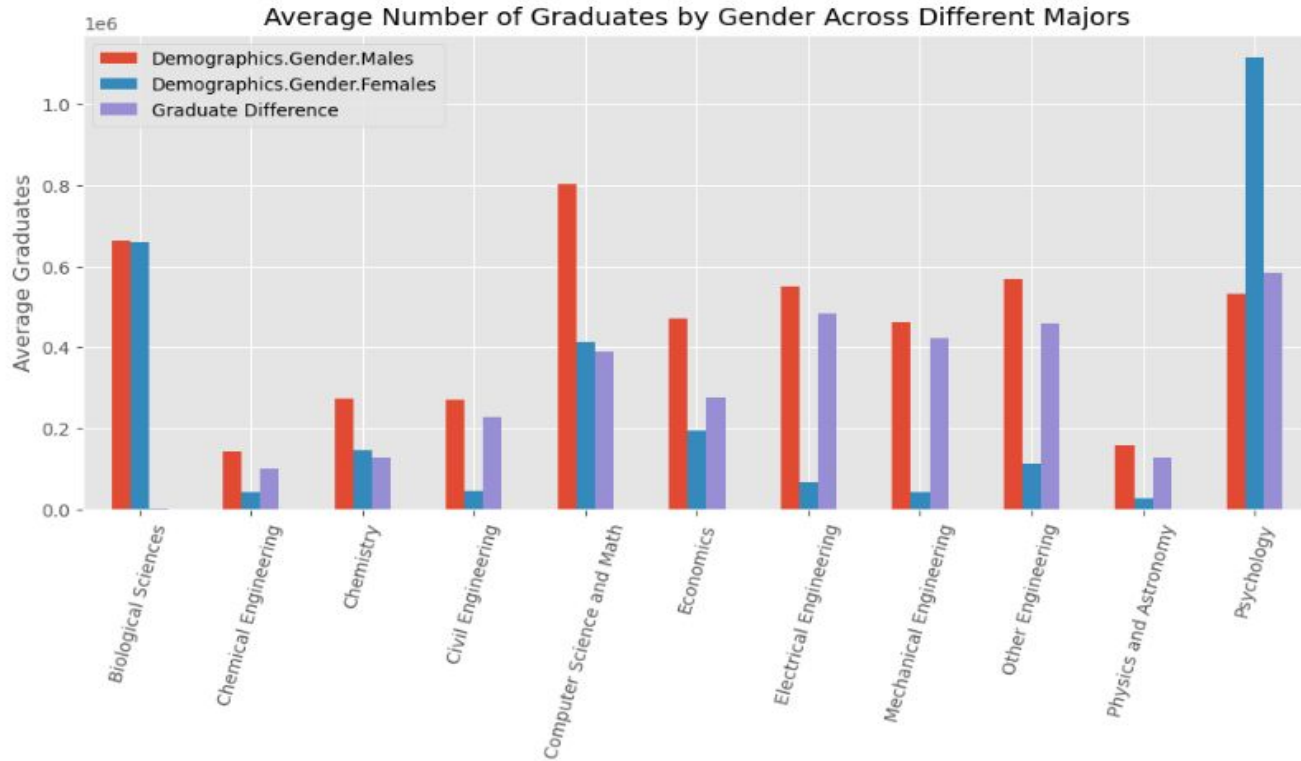
Which ethnic groups obtained the most degrees over the twenty year period from 1995 to 2015?



Which gender obtained the most degrees over the twenty year period from 1995 to 2015?

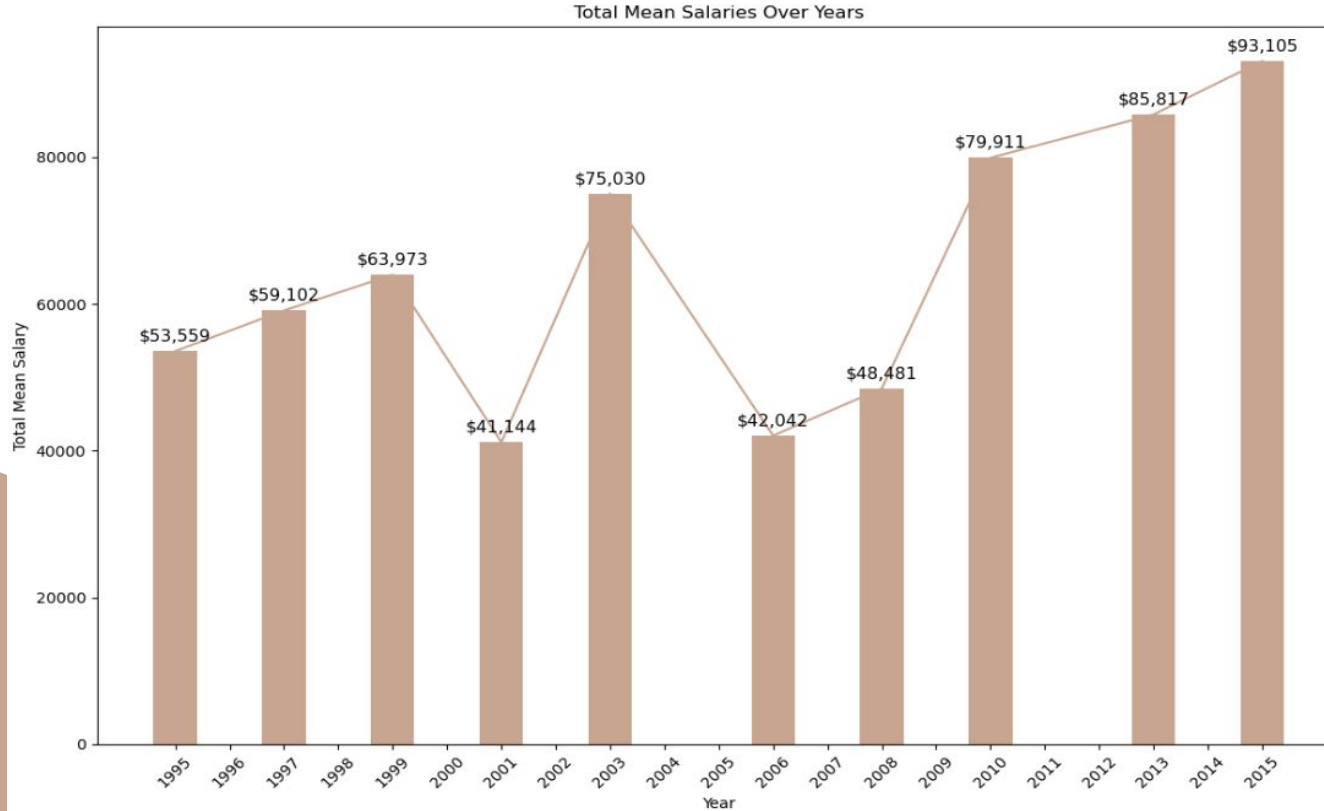


What's the difference amongst genders within each major across the twenty year period?

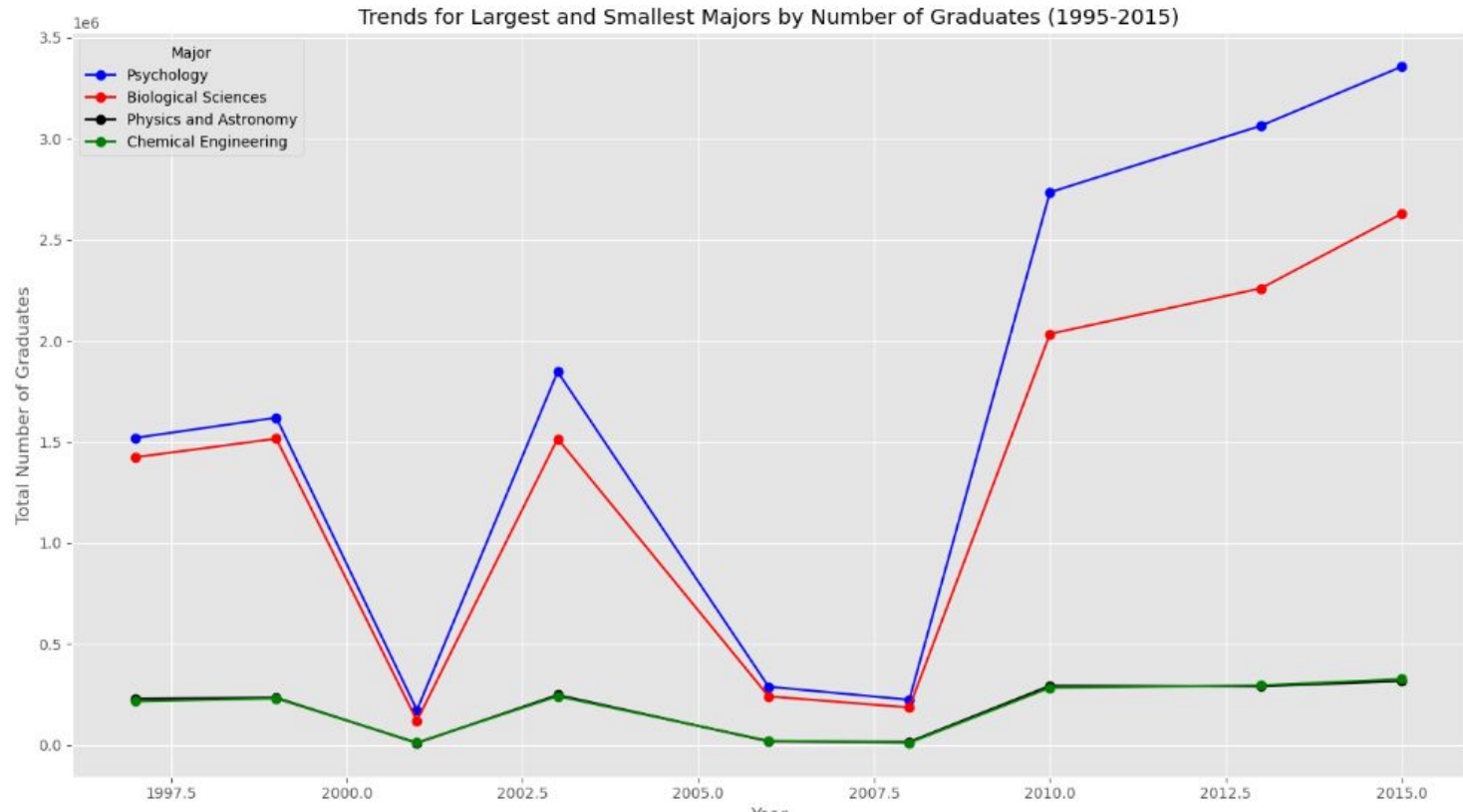


What's the total average salary for all majors across the twenty year period and has it grown or declined? What caused the dips?

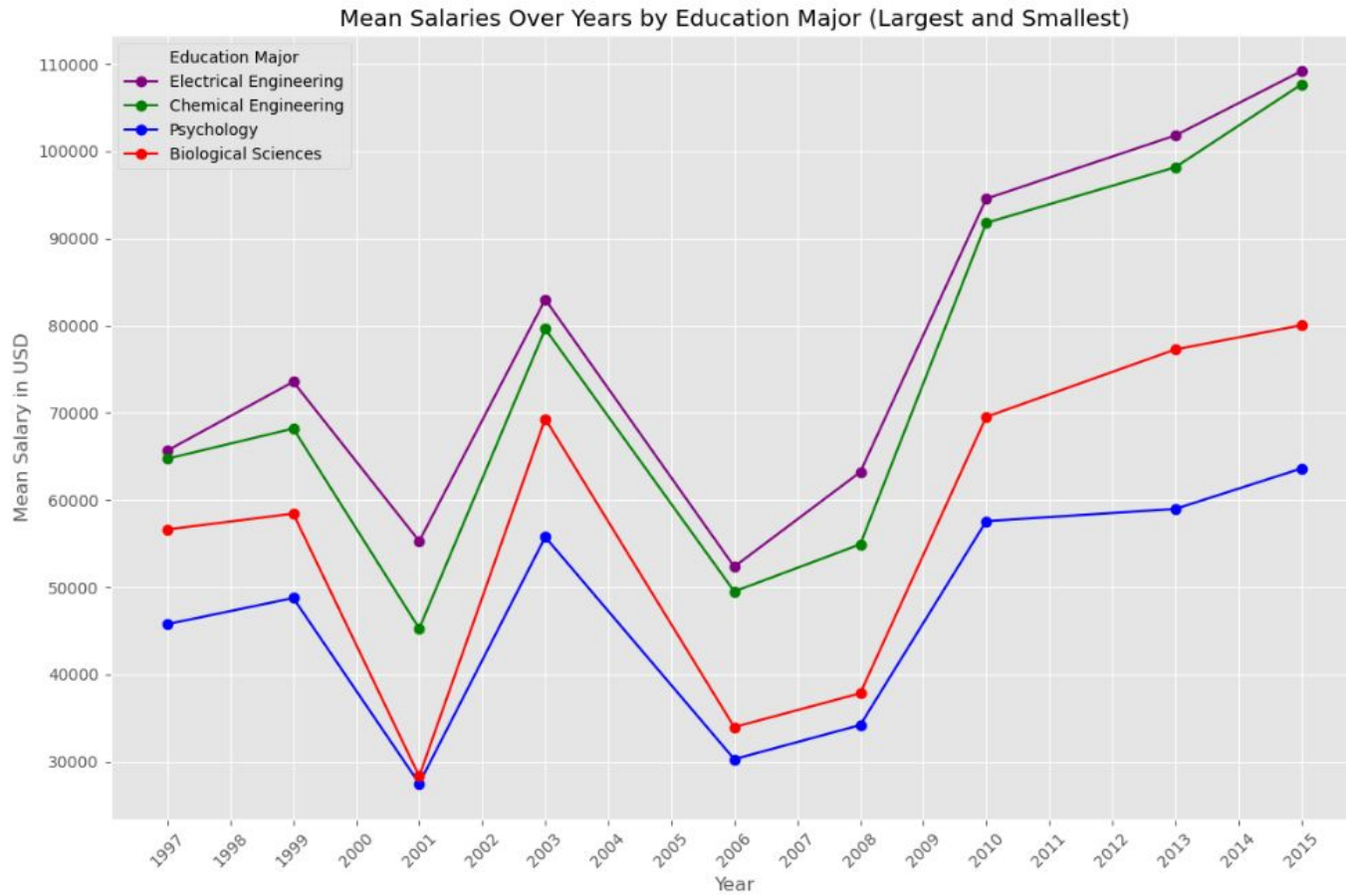
The percent change in average mean salary from 1995 to 2015 is +55.81 %



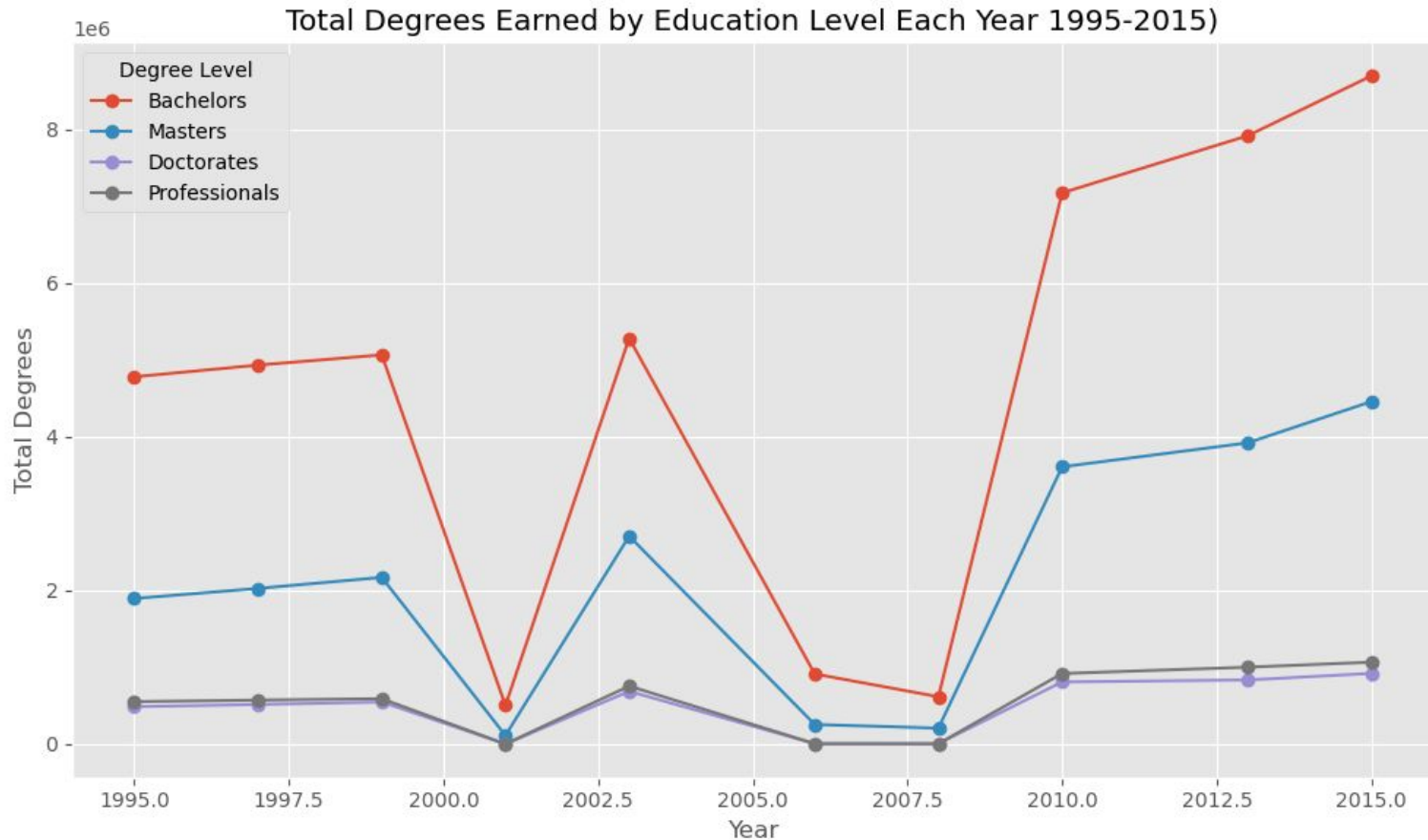
Which majors had the largest number of graduates and smallest number of graduates?



Which majors had the highest and lowest average salaries?

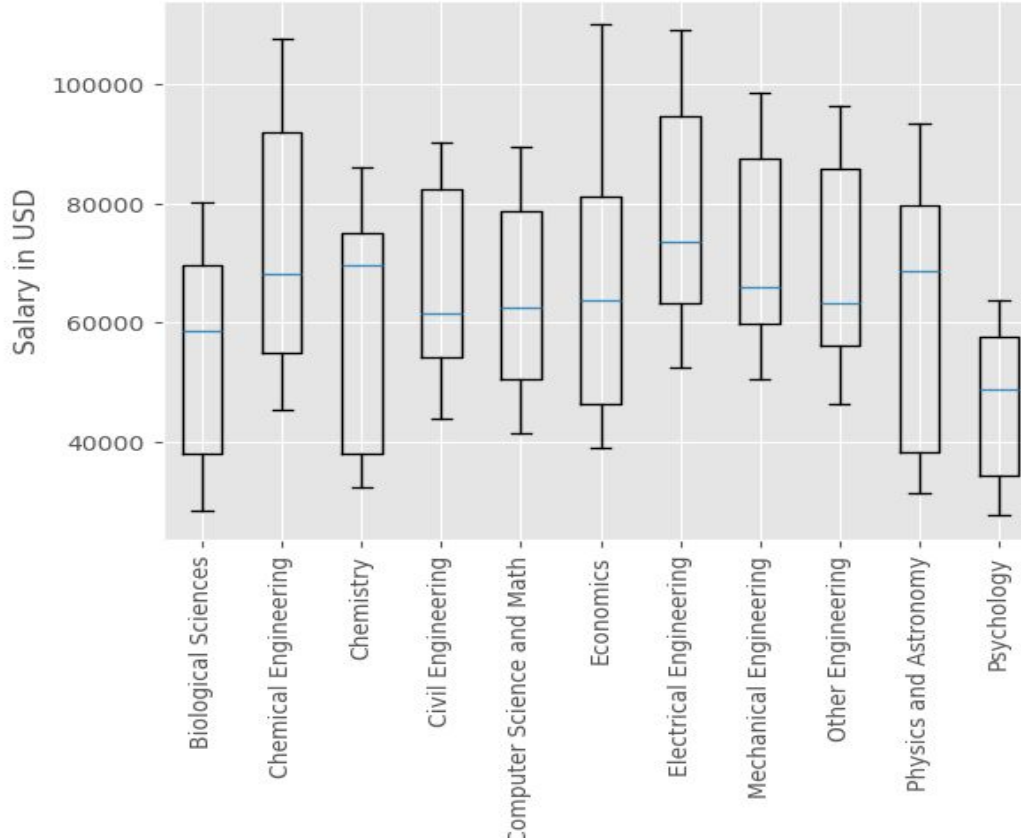


What is the distribution of degrees earned by educational level?



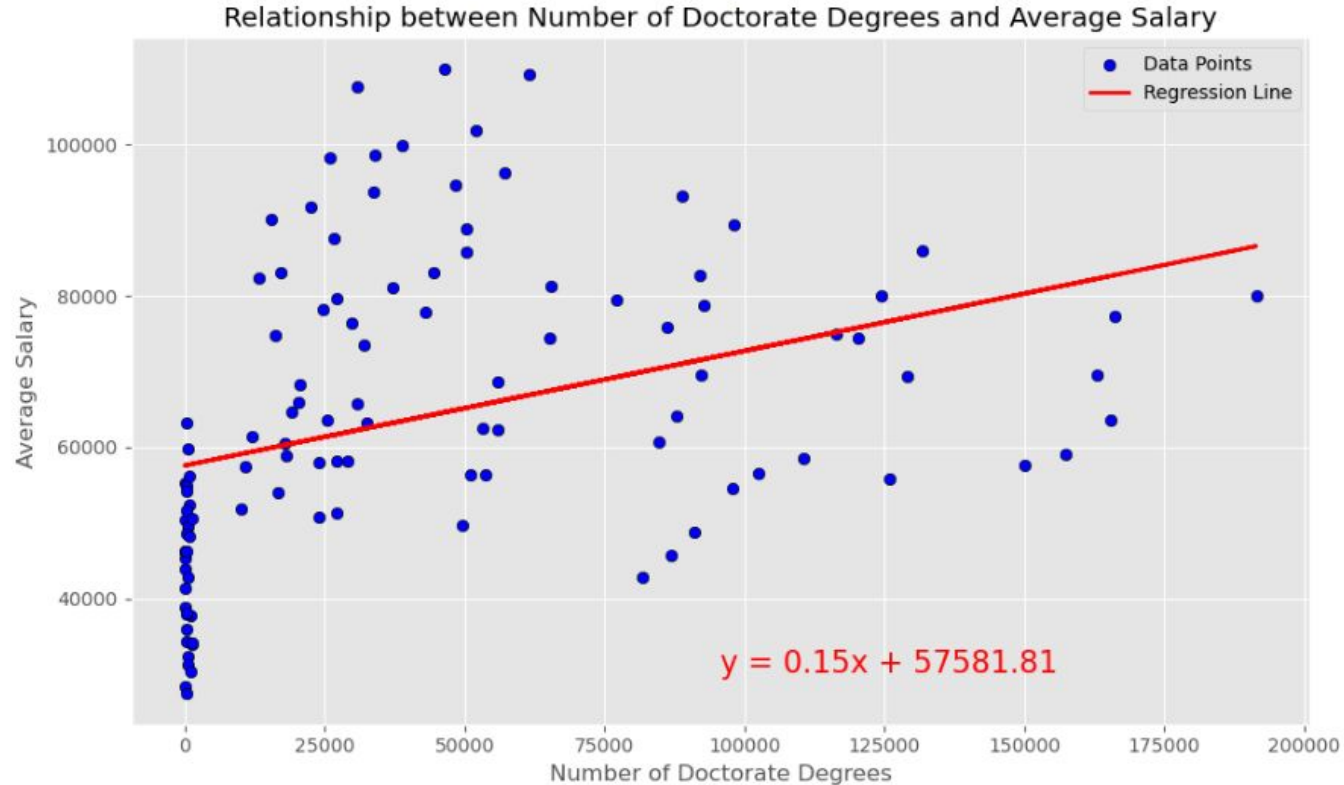
Due to the economic crashes, are there any outliers for the mean salaries of majors across the twenty year period?

Outliers of Mean Salaries Across 20 Year Period for Each Major



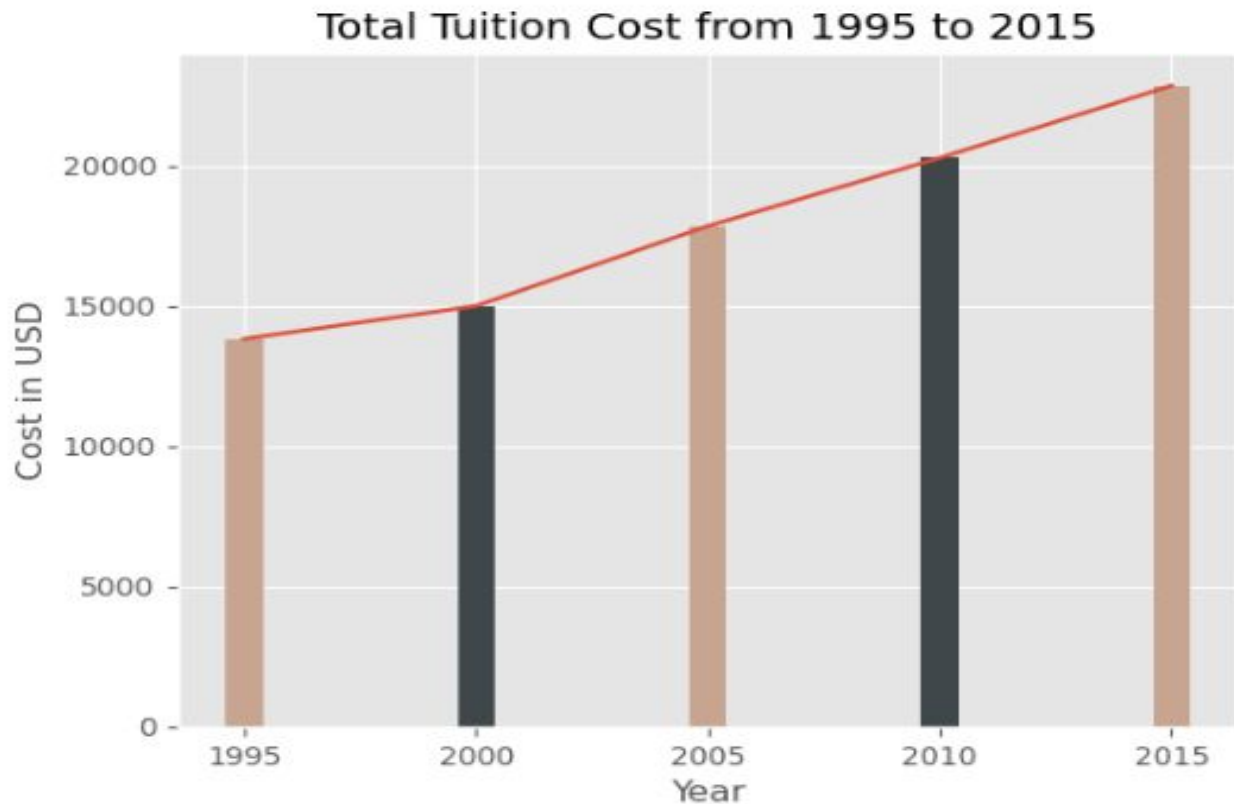
Which level of degree had the highest correlation between number of degrees awarded and average salary?

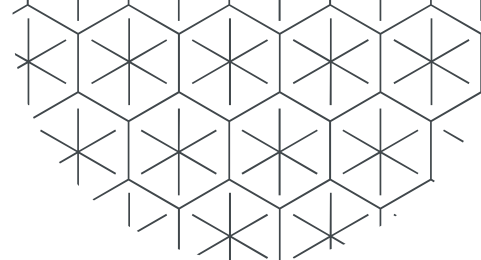
Correlation between the number of doctorate degrees awarded and the average salary: 0.3621135498308298



How has tuition cost changed over the years?

The percent change in cost of total tuition from 1995 to 2015 is +39.52 %





What's Next?

- Update Data Sets
- Compare Trend Lines from Projected to Actual Values to Predict the Future Salary for Each Major
- Help Predict future Tuition Costs vs Predicted Salaries to Influence College Decisions



Thanks

Questions?

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