# EasyVisa Project

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12/17/2021

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Business Problem Overview and Solution Approach

- Businesses in the United States are facing high shortage of workers. They therefore hire workers both locally and internationally.

- The Immigration and Nationality Act(INA) of the US permits certain category of foreign workers to be granted visas to work in the US, provided their work would not hurt the wages or chances of US workers

- The Office of Foreign Labor Certification(OFLC) process job certification applications for employers seeking to bring foreign workers into the US and grants certification grant certification in cases when employers can demonstrate there are not sufficient workers in the US for such roles at the prevailing or higher wage

- The increasing number of applications processed every year running into over 700, 000 in 2016 makes it imperative for a machine learning based solution to shortlisting applicants that have high chances of approval

- The task at hand involves analyzing data provided for prospective employees 602,069, some of which were certified other denied, and making business recommendation

- The characteristics include continent of the applicants, education level, prevailing wage of the companies they are to work, experience of the applicants, number of employees of the company, and whether the job is full time or part time.
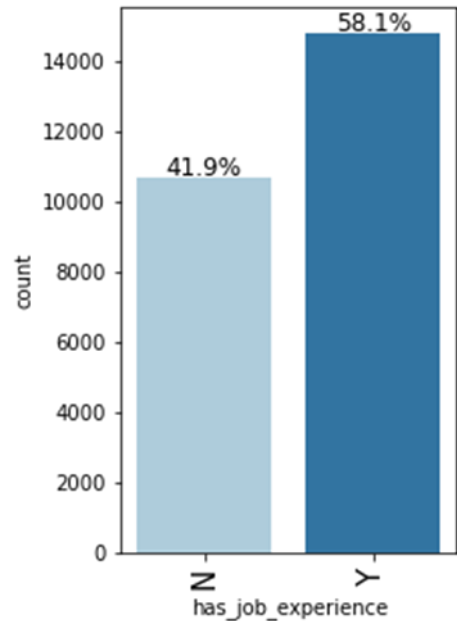
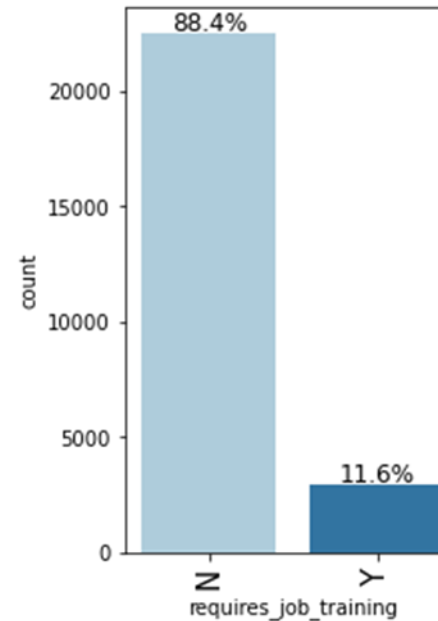# Exploratory Data Analysis - Univariate ⬤
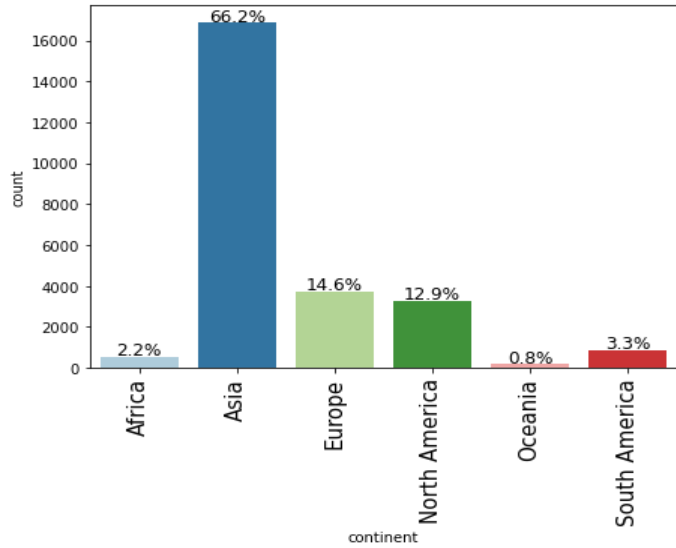
- ➢ About two-thirds of the visa were applied for Asians

- ➢ Europe and North America follow with 14.6% and 12.9% respectively.

- ➢ Africa, South America and Oceania make just 6.1% of the employees
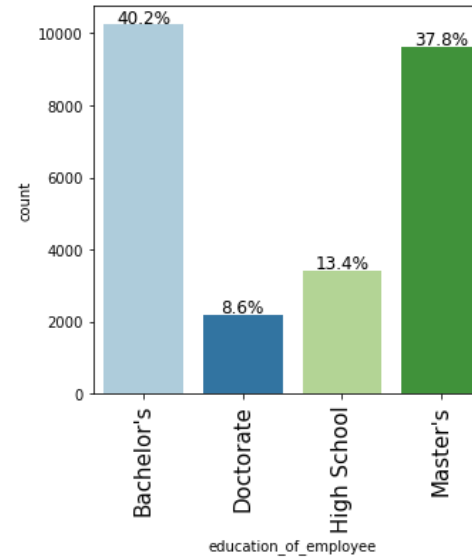
- ➢ 87% of the visas were for people with college degree

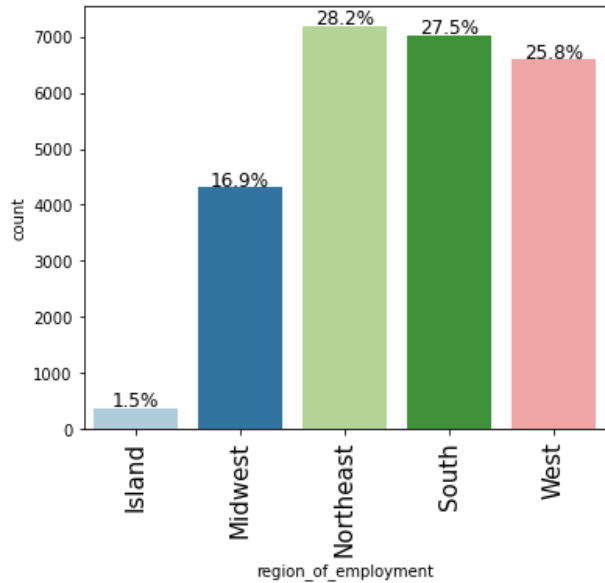- ➢ 46% had an advance degree

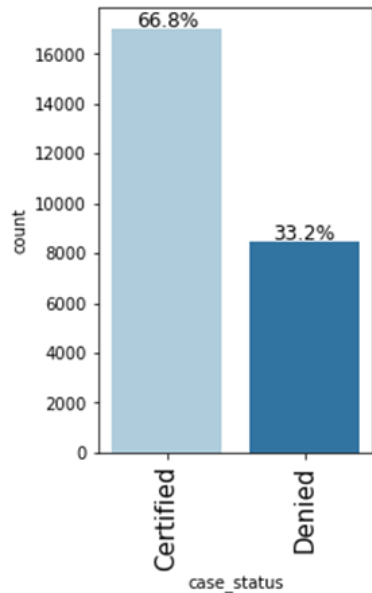- ➢ 58.1% of the applicants had Job experience

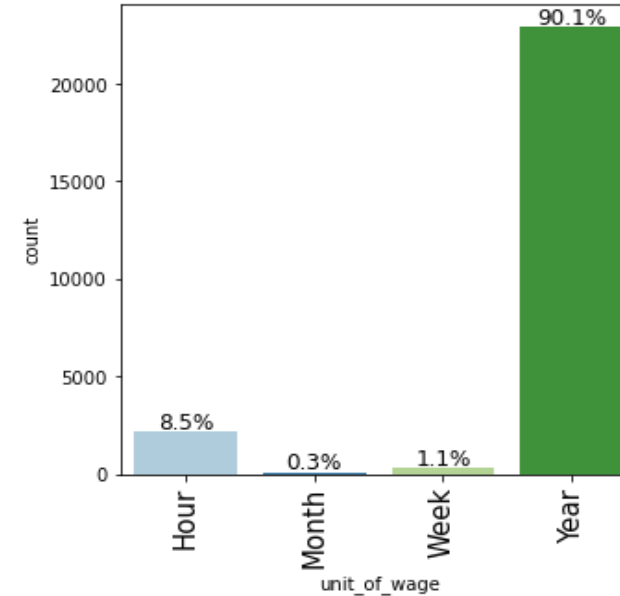Most of the prospective employees (88.4%) required no job experience

Univariate Analysis

➢ The intended region of employment is similar for the Northeast, South and West

➢ The numbers for Midwest are lower

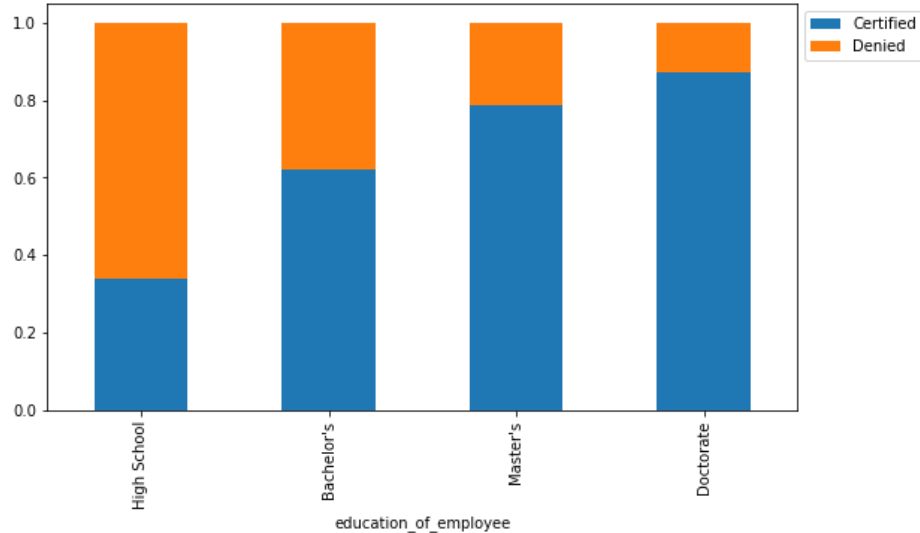➢ The Islands have the lowest number of prospective employees

About two-thirds of employers visas are certified. The rest are denied.

➢ The unit of employees wages are mostly in year

➢ Only 9.9% of employees had their unit wages not in year

➢ Hourly wage unit is second highest at 8.5%

➢ Only ~1.4% of the employees had their unit wage in Month or week
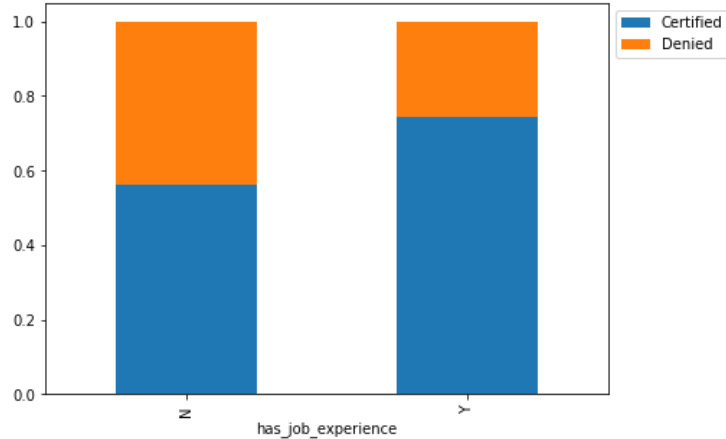
Bivariate Analysis

The chances of visa certification increases with higher education

Employees with advanced degrees have almost 80% approval rate

Employees with with Bachelor's have about 60% approval rate whiles High School leavers have just about 35% approval rate
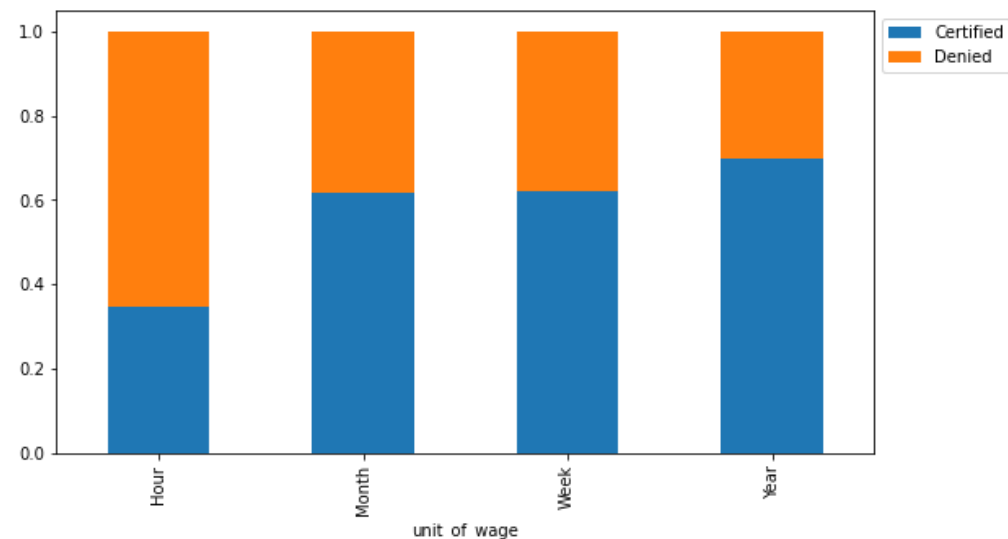
People with higher education should be prioritize in shortlisting for the visa

Job experience is not a big factor in visa certification

Those with job experience have 75% change and those without have 55% of certification

Bavariate Analysis

> Visa certification rate was similar for worker with unit of wage in month, week and wage (about 60%)

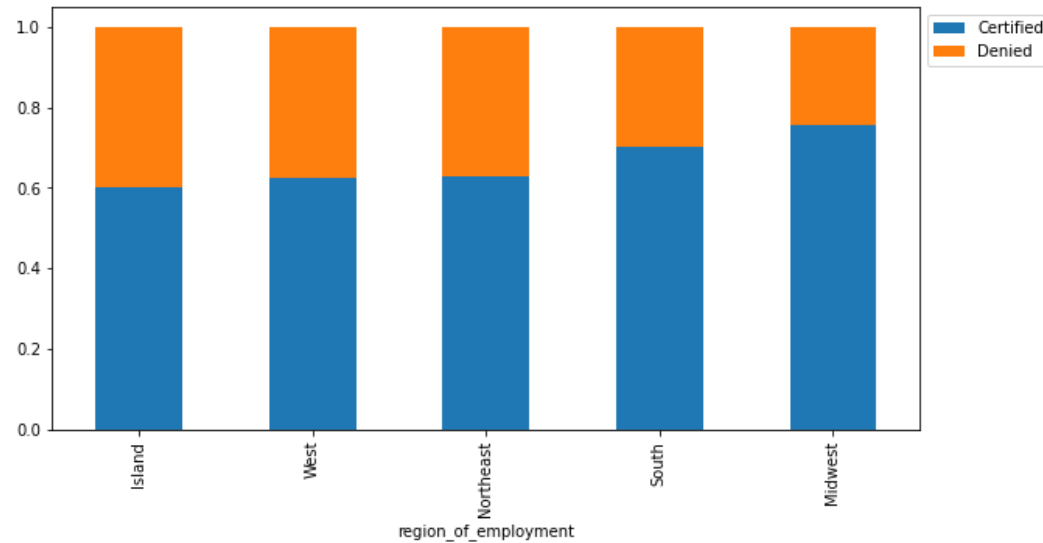> Hourly wage workers had low visa certification rate ~35%
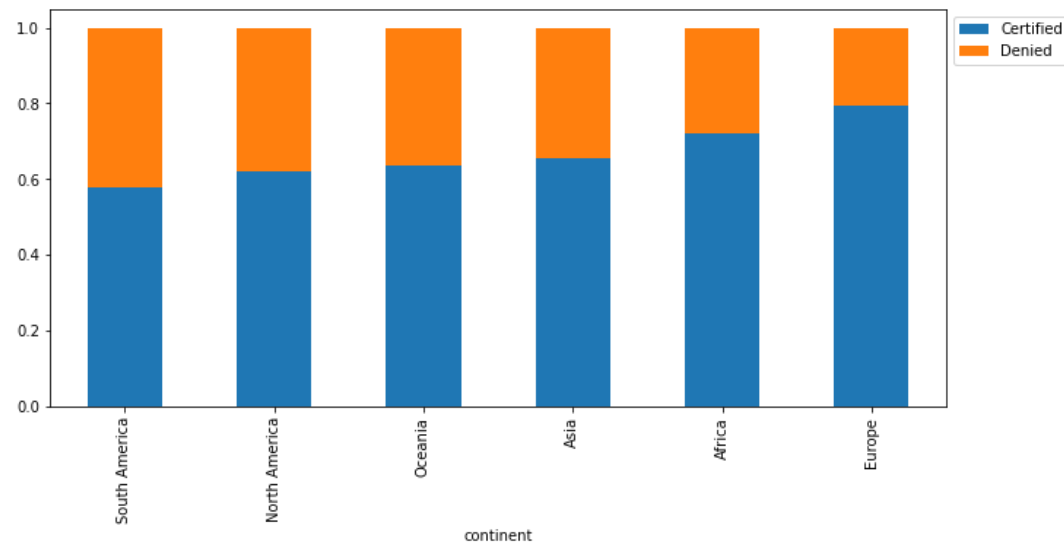
European had slightly better chance of being certified than prospective employees from other continent

This was followed by Africans

The rest of the employees had similar chances of being certified

All continent should be prioritize equaly when short listing for visa

Bavariate Analysis

➢ Employees going to the Midwest and South have slightly better chance of being certified than those going to the North East West and the Island

➢ The difference is minimal and should not weight in shorlisting
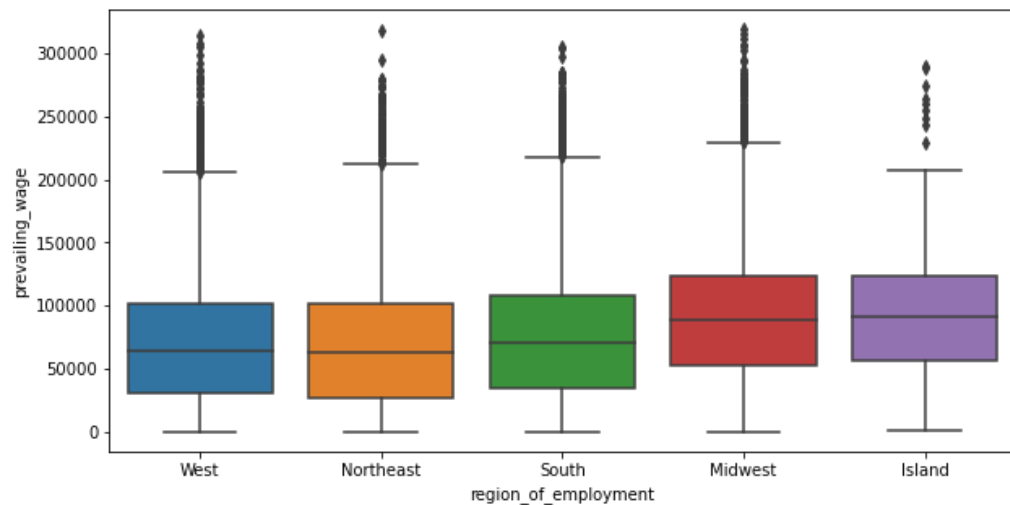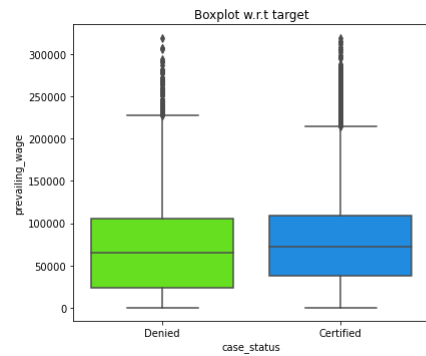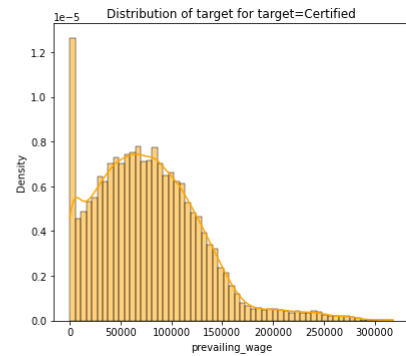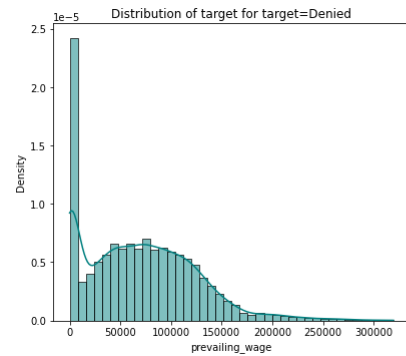
➤ Wages are right-skewed

➤ Prospective employees certified have higher mean prevailing wage

➤ The Islands and the Midwest have higher mean prevailing Wage
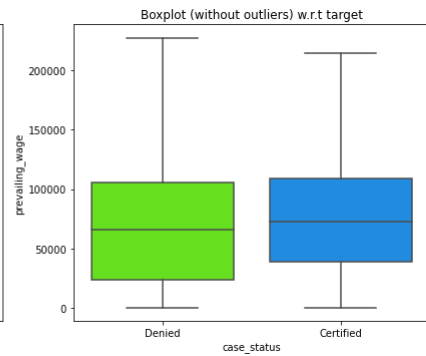
➤ The rest: West, Northeast and South have similar mean Prevailing wage

➤ Mean prevailing wages in all regions have outliers who who earn higher than the population

Model Performance Summary

|	Train Accuracy	Test Accuracy	Train Recall	Test Recall	Train Precision	Test Precision	Train F1	Test F1
Decision Tree	0.712548	0.706567	0.931923	0.930852	0.720067	0.715447	0.812411	0.809058
Tuned Decision Tree	0.712548	0.706567	0.931923	0.930852	0.720067	0.715447	0.812411	0.809058
Bagging Classifier	0.985198	0.691523	0.985982	0.764153	0.99181	0.771711	0.988887	0.767913
Tuned Bagging Classifier	0.996187	0.724228	0.999916	0.895397	0.994407	0.743857	0.997154	0.812622
Random Forest	0.999944	0.720827	0.999916	0.832125	1	0.768869	0.999958	0.799247
Tuned Random Forest	0.769119	0.738095	0.91866	0.898923	0.776556	0.755391	0.841652	0.82093
Adaboost Classifier	0.738226	0.734301	0.887182	0.885015	0.760688	0.757799	0.81908	0.816481
Tuned Adaboost Classifier	0.719163	0.716641	0.781415	0.781587	0.79469	0.79151	0.787997	0.786517
Gradient Boost Classifier	0.758802	0.744767	0.88374	0.876004	0.783042	0.772366	0.830349	0.820927
Tuned Gradient Boost Classifier	0.764017	0.743459	0.882649	0.871303	0.789059	0.773296	0.833234	0.819379
XGBoost Classifier	0.838753	0.74516	0.931419	0.86954	0.843482	0.775913	0.885272	0.820063
XGBoost Classifier Tuned	0.765474	0.74516	0.881642	0.86954	0.791127	0.775913	0.833935	0.820063
Stacking Classifier	0.770072	0.744244	0.894149	0.879922	0.789505	0.769969	0.838575	0.821282

→ Best performing model

Confusion matrix - Adaboost Classifier Test set

Feature Importances
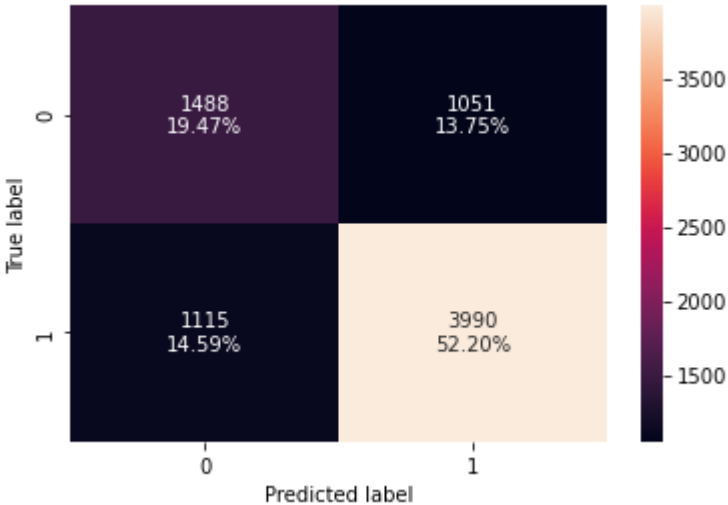
Feature Importances
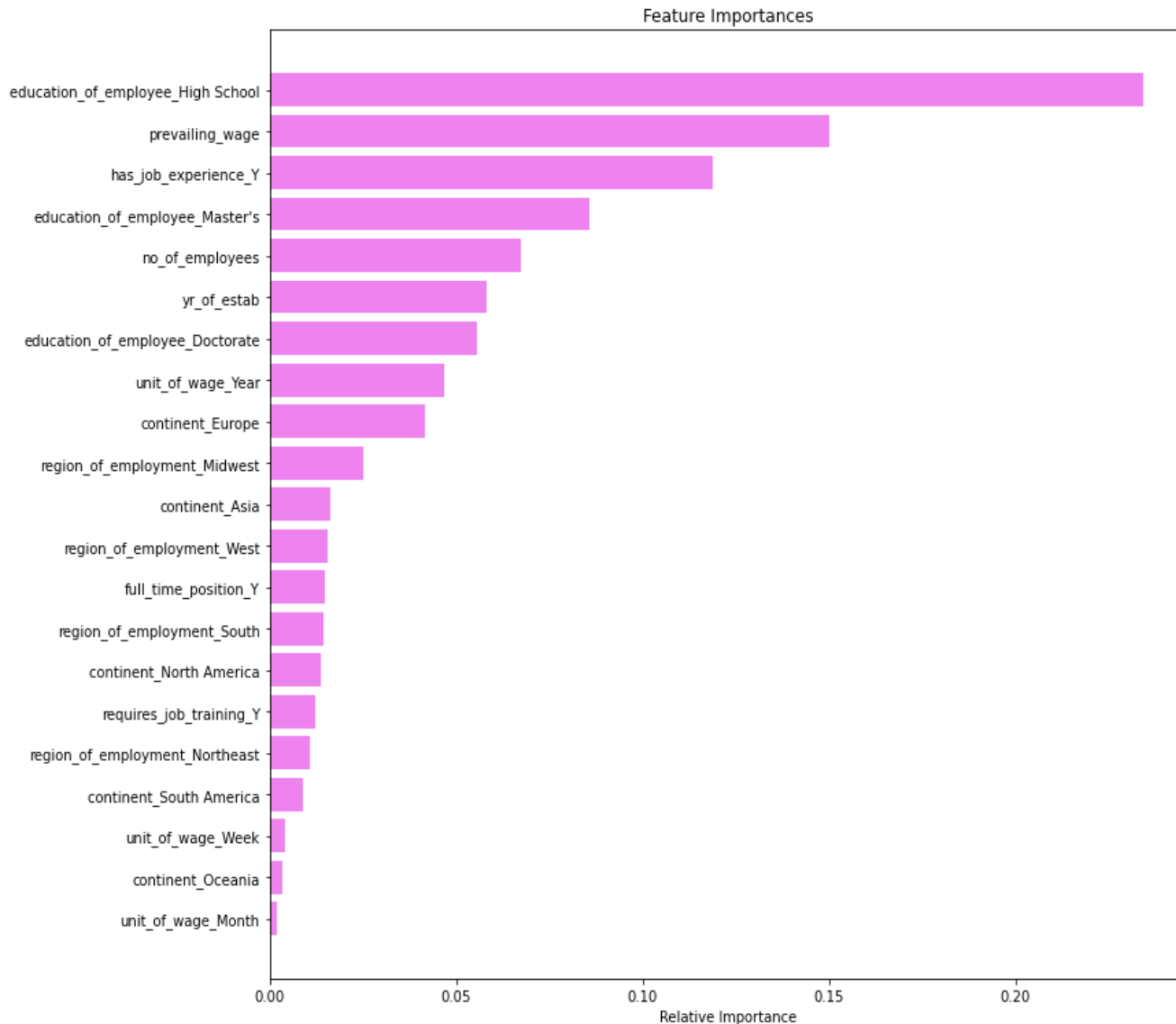
The feature importances indicate that the most important the most important predictors for visa certification are from highest other of importance:

➢ High school education

➢ Prevailing wage

➢ Job experience

➢ Number of employees of the company applying on behalf o

➢ Of the foreign worker

➢ Year of establishment

Business Insights and Recommendations

- Based on our analysis, the number one criteria for shortlisting foreign workers for employment based visa is high school education.

- Although people with higher education are more likely to be certified, high school education is the basic requirement for approval.

- The next is the prevailing wage. The prospective foreign employees with job offers to companies with high prevailing wages are more likely to have their visas approve. But their salaries must not be less than the prevailing wage. Candidates the fit this criteria should be shortlisted

- It's important that the unit of wage be fixed in per year to enhance their chances of approval

- Job experience is the third factor to consider. Those with job experience are more likely to be certified, especially for employees without advanced degrees

- Visa seekers from Europe are also more likely to be certified than those from other continents. European should therefore be giving a lower bar for shortlisting than people from other continent

- Those with job offers from Midwest are also more likely to be certified.