



Prosper Loan Exploration

ALEXANDRIA NICOLE NEWCOMB

Investigation Overview

I wanted to look how the various factors of the borrower would act on the prosper score and the interest rate the borrowers received. The main factors of investigation were:

- ▶ Borrower Rate (interest rate)
- ▶ Income Range
- ▶ Credit Score
- ▶ Prosper Rating
- ▶ Original Loan Amount

Data Set Overview

The data consisted of around 113,000 loan entries, but was cut down to 84,000 after removing values that did not have a prosper rating indicating that they were not completed loans or not given. There were several attributes in the data set, 82 in all, but we focused on ones that were deemed to be the most relevant to interest rate.

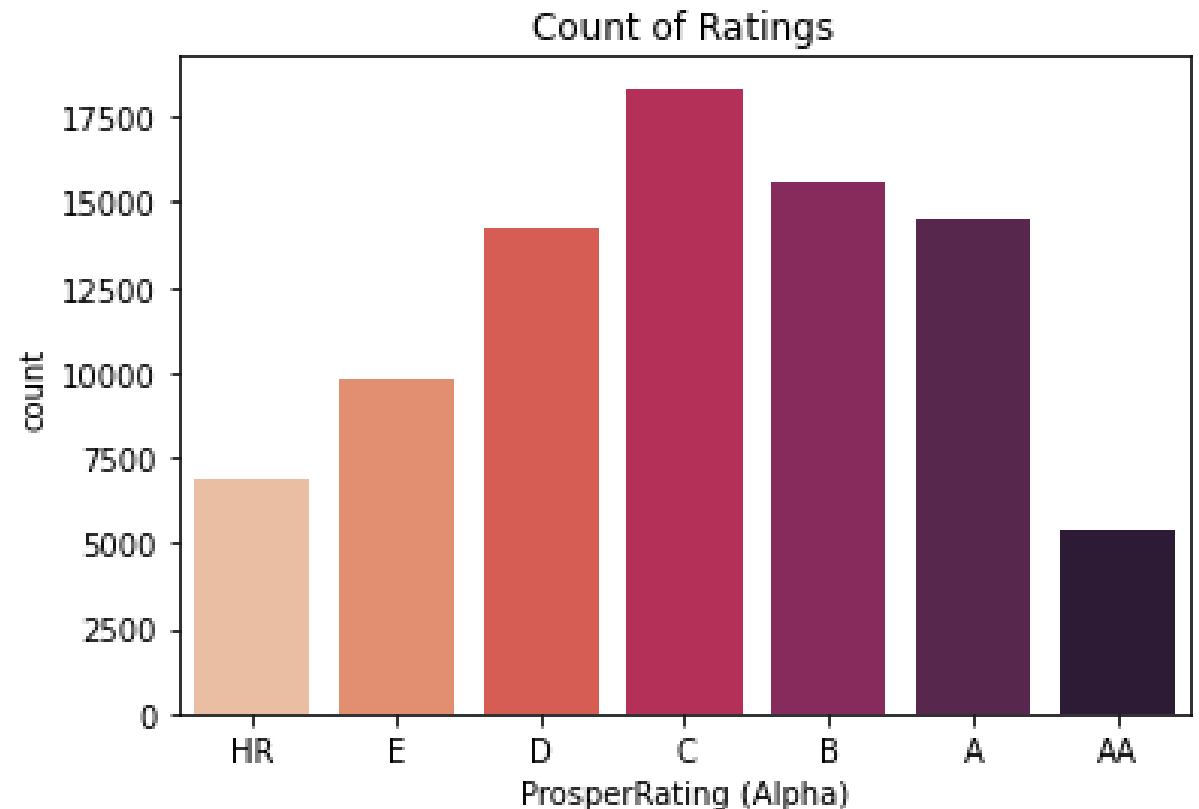
The data was checked and some facets were cleaned (credit score) for ease of use.

Prosper Ratings by Count

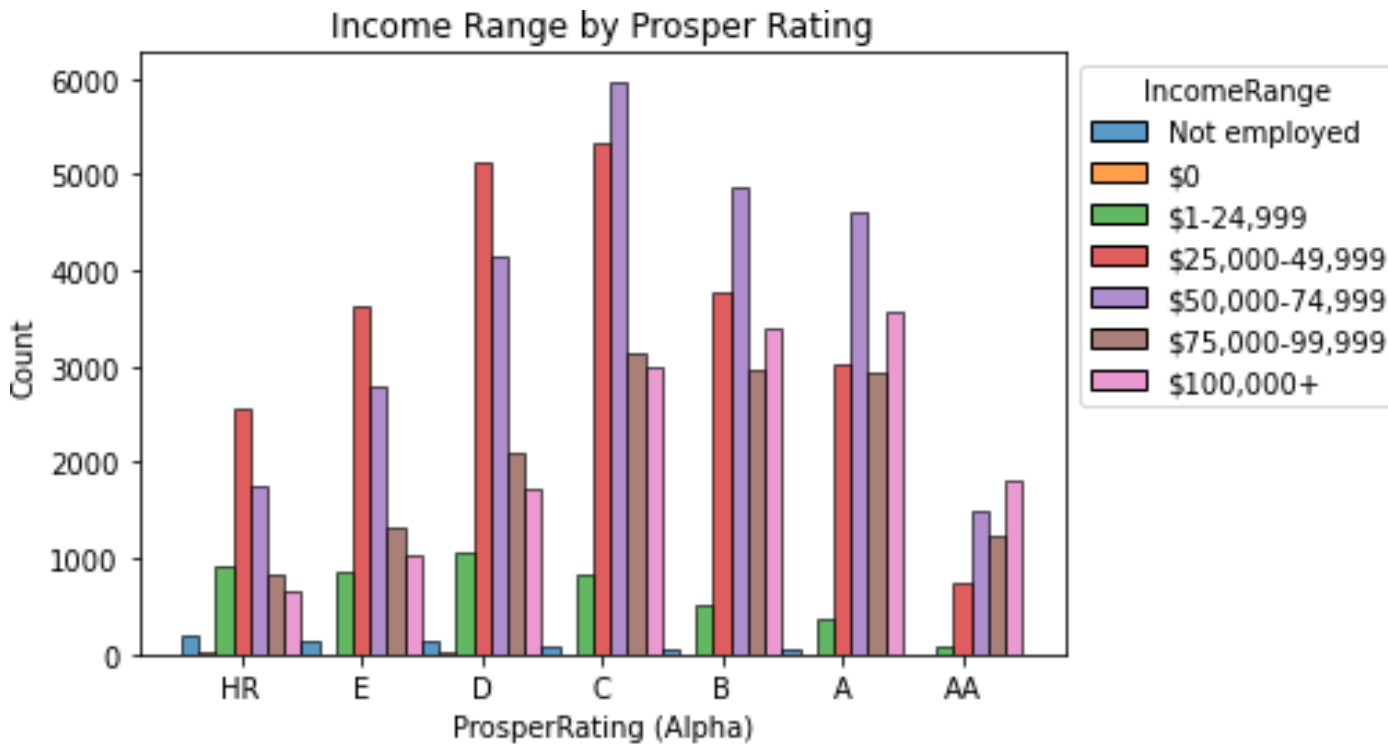
Prosper Rating is a alpha code that is assigned to every loan request and symbolizes the relative risk of granting that loan.

Risk being whether the loan is paid back or not.

- ▶ The ratings are:
 - ▶ unimodal centered around the middle rating 'C'
 - ▶ a large drop between 'A' and 'AA'



Prosper Rating by Income Range

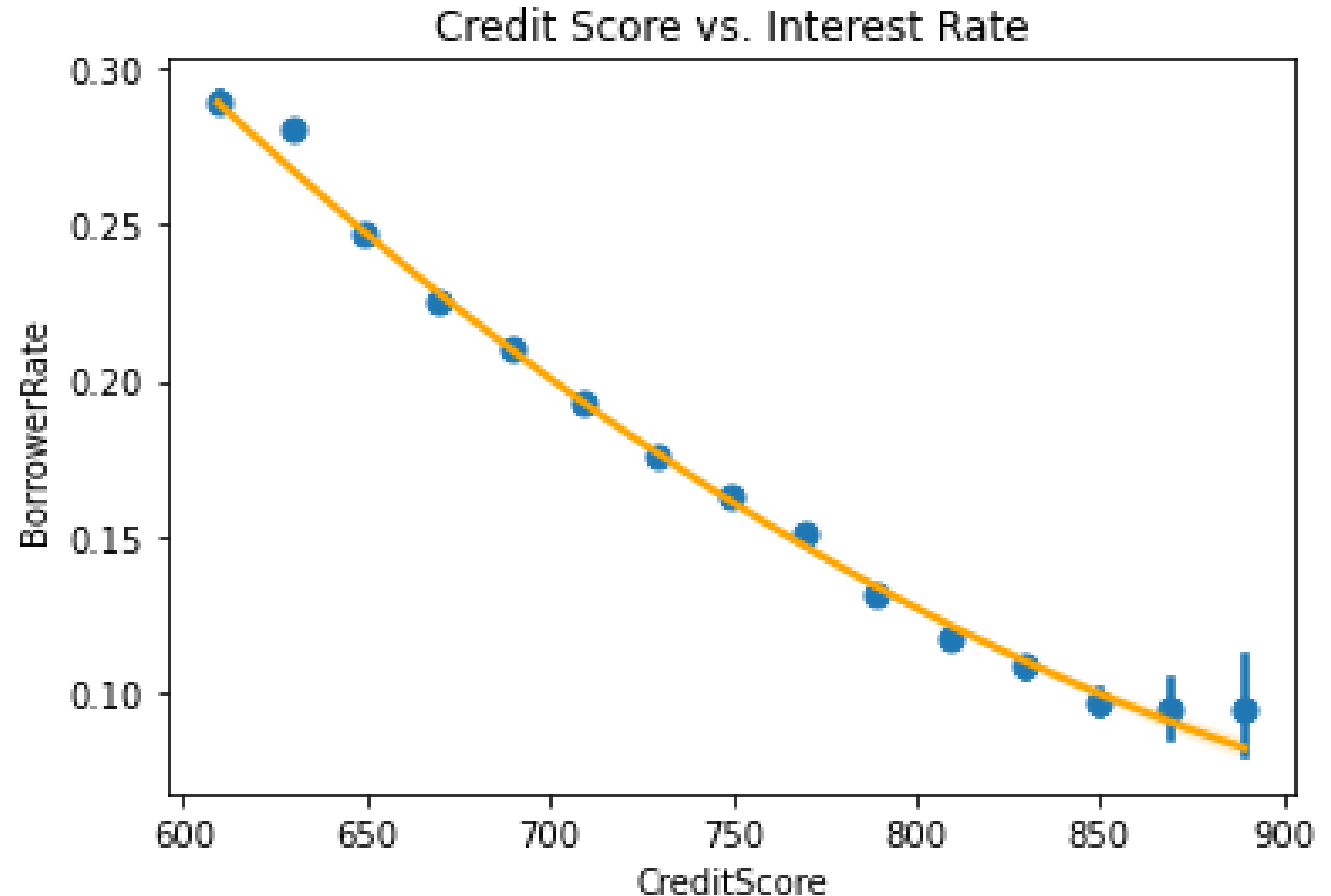


There are clear differences between the ratings and income range.

- ▶ the lowest actual income range, 1-25k, peaks at the 'D' rating
- ▶ no employment listed peaking at the lowest rating assigned, 'HR' or High Risk
- ▶ the 25K-50K range peaks at rating 'C' as does the next step up in income 50K-75k
- ▶ 100k+ range peaks at an 'A' rating
- ▶ 75-100K, plateaus at 'C' and remains consistent until a steep decline at 'AA'

Credit Score vs. Interest Rate

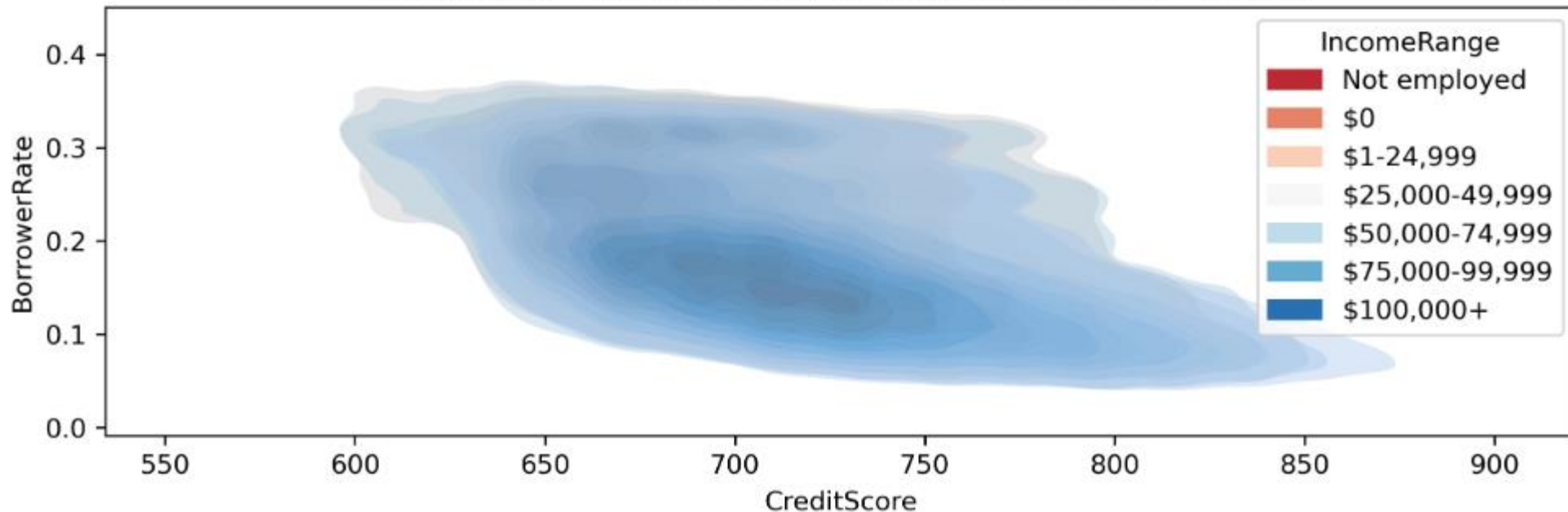
- ▶ the credit score used here is a mean between the upper range and the lower range
- ▶ we used a polynomial regression line for best fit
- ▶ the relationship between Credit Score and interest rate is clear and linear
- ▶ as credit score increases, the interest rate is decreased, steeply at first and then it tails off
- ▶ this indicates that credit score has an incredibly strong relationship with interest rate



Interest Rate vs. Credit Score by Income Range

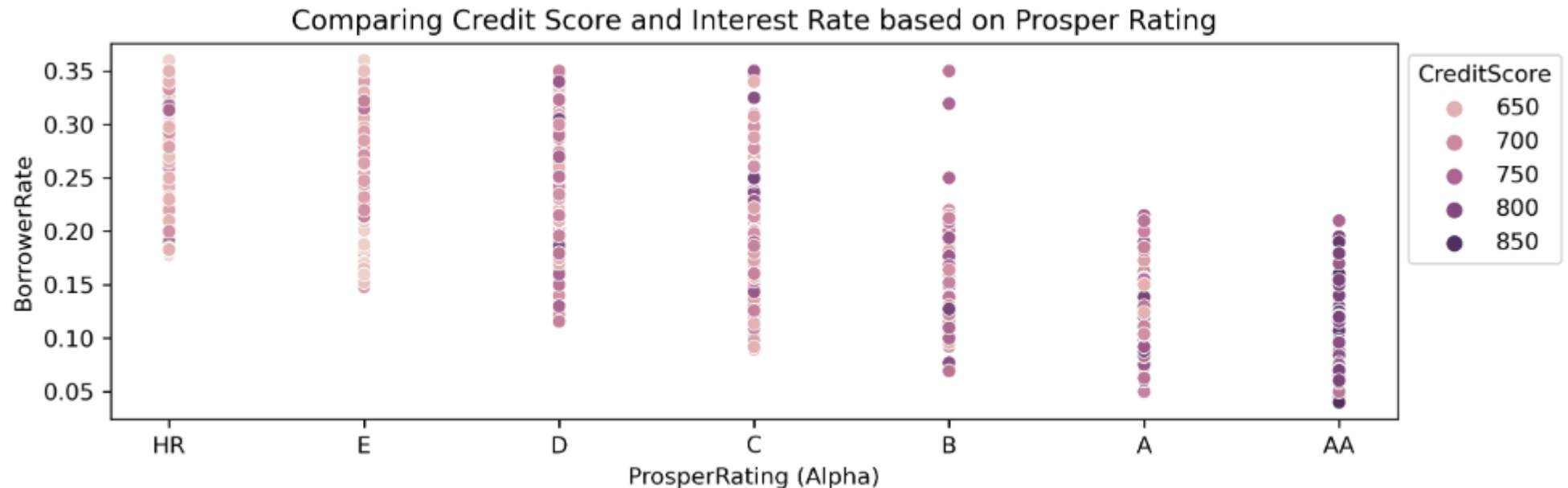
We know that credit score has a bearing on interest rate and we know that income range affects prosper rating, so to see how income range affects credit score and interest rate I made a KDE chart which allows us to see a clear, if messy, relationship. We see that most are clustered around a credit score of 725, with lower earners providing more variance. We also see that even if two borrowers have the same credit score, a difference in income would more likely get them a much higher interest rate.

Comparing Credit Score and Interest Rate based on Income



Prosper Rate vs. Interest Rate by Credit Score

Building off of the last chart, we see the intersection of the Prosper Rating on interest rate and how credit score is used in that. There is a clear interaction as we see credit scores get much higher as the ratings get higher. However, this is not a perfect 1:1, as we saw in the previous example. There are people with excellent credit scores still receiving 'D' and 'C' scores. There are also people who have low credit scores receiving excellent interest rates and prosper score.



Conclusions

- ▶ Interest rate has a strong connection with all other variables listed. However, interest rate is not necessarily a given.
 - ▶ This is because interest rate can be adjusted by several factors not studied, for example if a human assigned the interest rate (as normally happens), there is bound to be flux, variation, and biases in their assignments.
- ▶ We see a strong relationship between credit score, income range, interest rate, and the Prosper Rating of risk given. The Prosper rating clearly interacts with these factors, but the score is still not a 1:1, indicates other factors at play, which will be researched in future exploration.