Regression Analysis:

Predicting the International vs. Domestic Share of Box Office Revenue

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INTRODUCTION

OVERVIEW

- Global markets: significant source of revenue for US made movies
- Predicting if a movie will produce a high international response would be helpful for a movie distributor to have in its business decision making toolkit

PROJECT GOAL:

Using data from Box Office Mojo, build a predictive model for international percentage (%) of revenue for domestic made movies

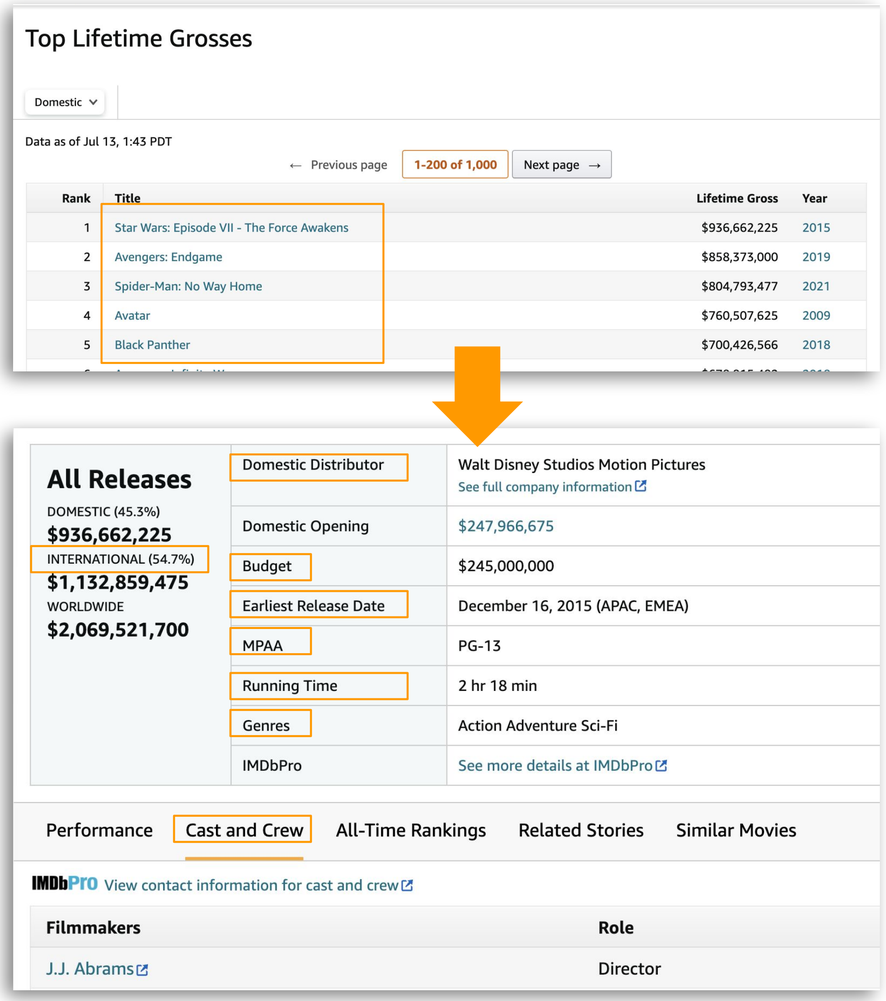
METHODOLOGY

DATA

Sample Frame: 1000 domestic movie web pages from Box Office Mojo Top Lifetime Grosses page

Variables:

- *Target Variable (1):* International Revenue %
- *Feature Variables (95):*
  - **Numeric Vars:** [Year, Run Time, Budget (adjusted for inflation)]
  - **Categorical Vars:** [Distributor, Rating, Genres, Directors, Actors, Release Month]



METHODOLOGY

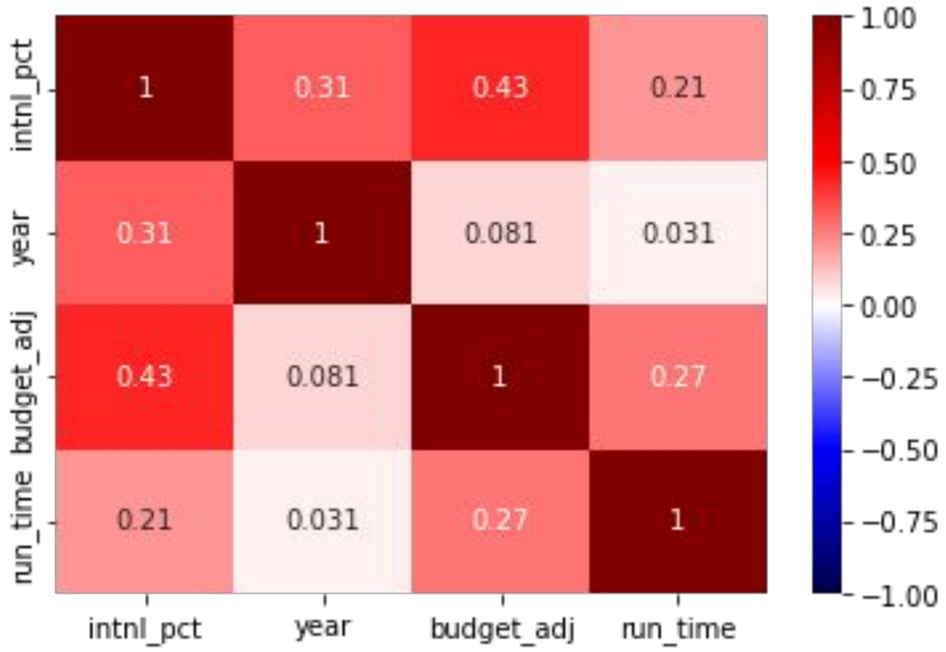
TOOLS

- **Web Scraping:** BeautifulSoup, Pickle
- **Regression Analysis:** SciKitLearn, statsmodels

METHODOLOGY

METRICS

- **Feature Engineering:**
  - Pairplots, heatmaps, and VIF analysis to ID/address collinearity
  - Residuals scatter plot to ID/address heteroskedasticity



METHODOLOGY

METRICS

- **Feature Engineering:**
  - Pairplots, heatmaps, and VIF analysis to ID/address **collinearity**
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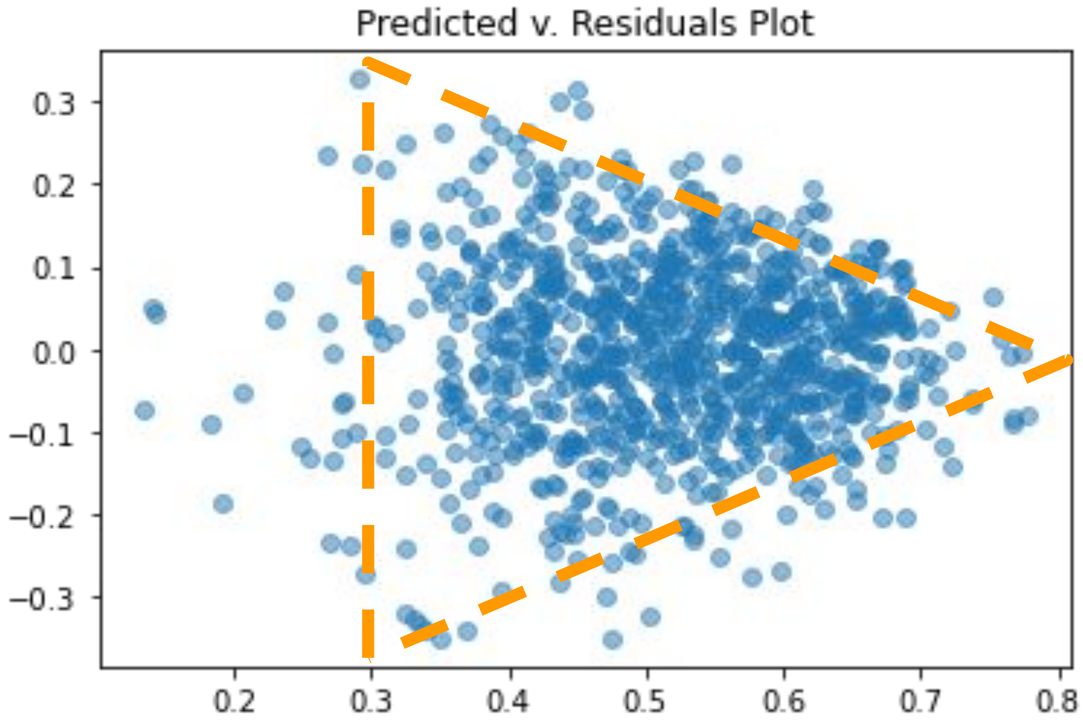
**Future Improvement: Was unable to ID target transformation to improve baseline in this project*



METHODOLOGY

METRICS

- **Model Training and Testing:**
  - 4 regression models
  - Scored for explanation power (**R^2 value**) and magnitude of error value (**MAE**):

Model	R^2	MAE
Standard OLS - KFold CV	0.33 ± 0.11	0.1 ± 0.01
Polynomial OLS - KFold CV	- 0.21 ± 0.36	0.13 ± 0.02
Ridge Regression - RidgeCV	.29	0.09
Lasso Regression - LassoCV	.33	0.09

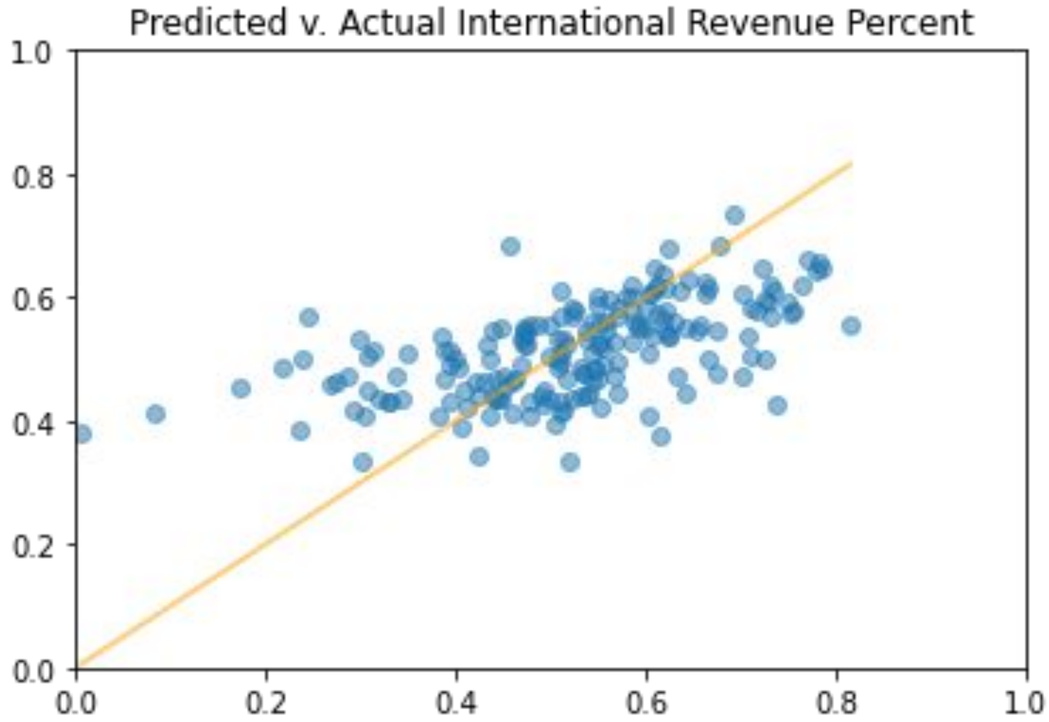
RESULTS

Final Model:

Lasso Regression, cross validated (LassoCV)

R^2 = .33

MAE = 0.09



RESULTS

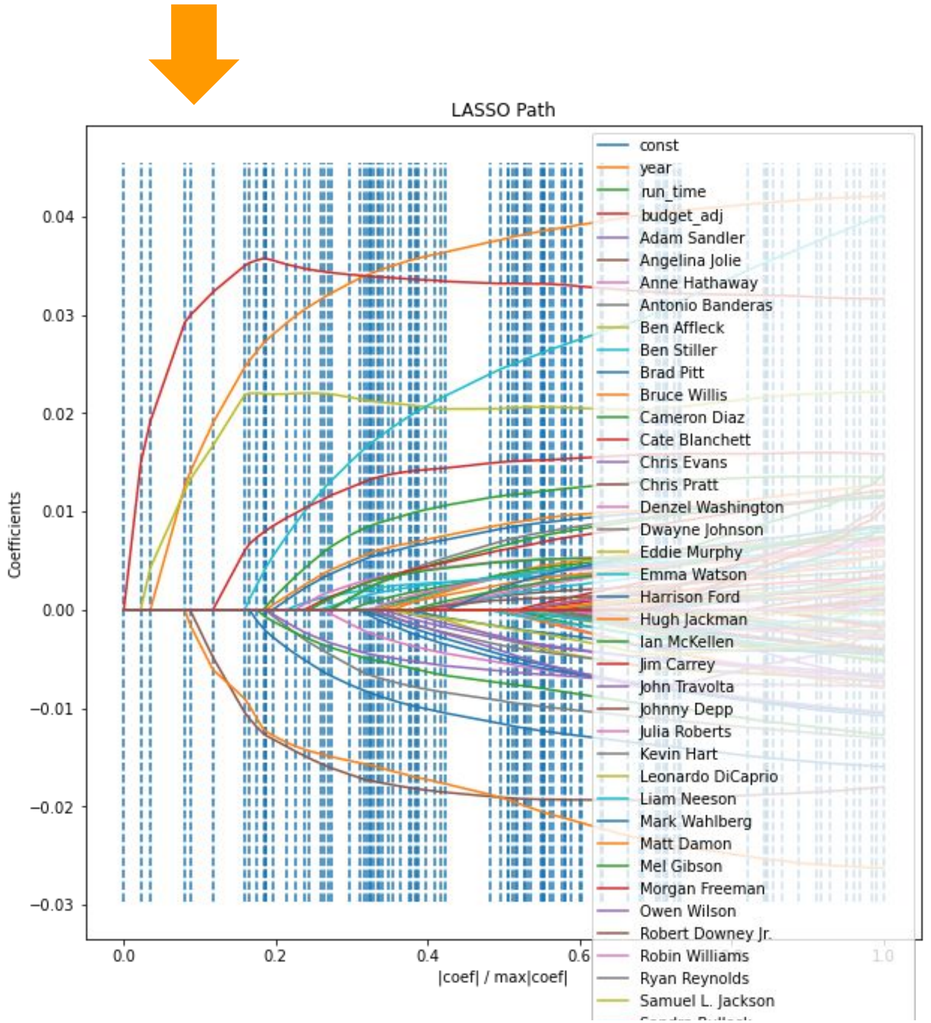
Variables with highest coefficient (standardized)

- 'budget_adj' 0.034
- 'year' 0.032
- 'Adventure' 0.022
- 'Will Ferrell' - 0.016
- 'Comedy' - 0.015
- 'Animation' 0.012
- 'Thriller' 0.011

Variables that were dropped to zero during Lasso Regression:

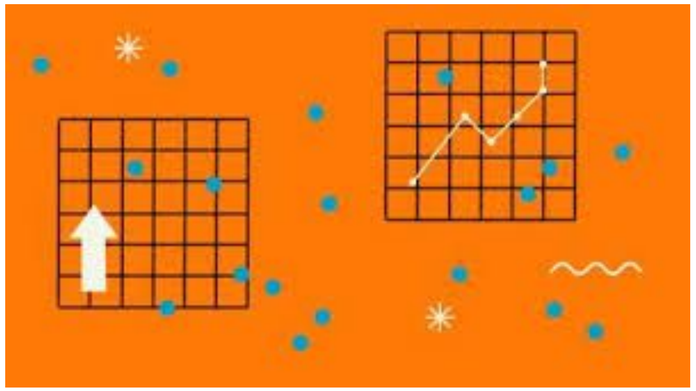
- Run Time
- All Directors
- All Distributors
- Al Months Released
- Most Actors
- Many Genres

cv tuned alpha = .01



CONCLUSIONS

Unfortunately, the model in its current form is not very predictive or useful for a business case.



Ways to improve the model

- Better sample Frame:
  - Use a much larger data set
  - Use a data set within a more recent time frame (last 10 years for example)

- More specific target:
  - International % may be too broad and capturing too many variables
  - Model can be refined to predict more specific targets, e.g. Chinese box office revenue

- Better features:
  - Search for another movie data website that has data that promises to be more explanatory for predicting international market targets