Predicting Horror IMDB Scores of Female Audiences

Jillian Etheredge

680 Horror Movies

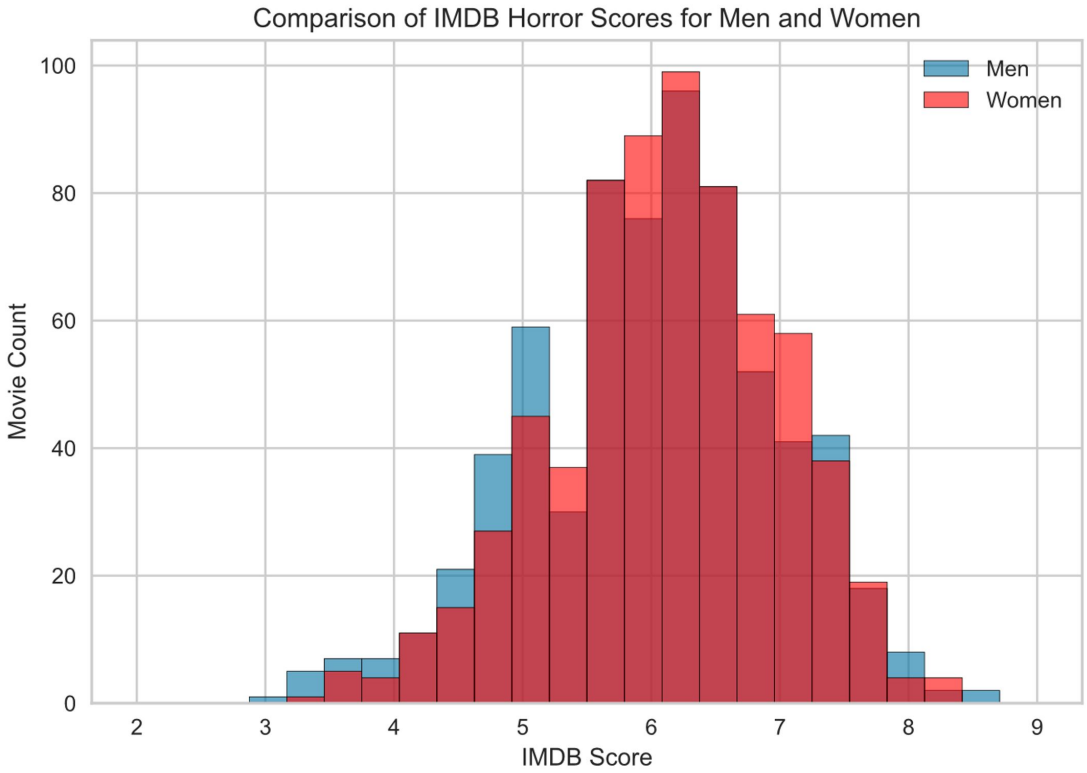
That’s a lot of movies

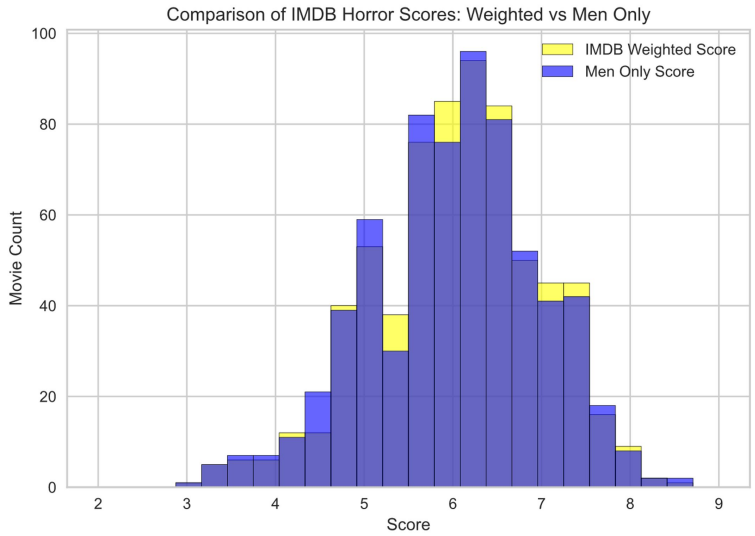
43,612,742 Votes

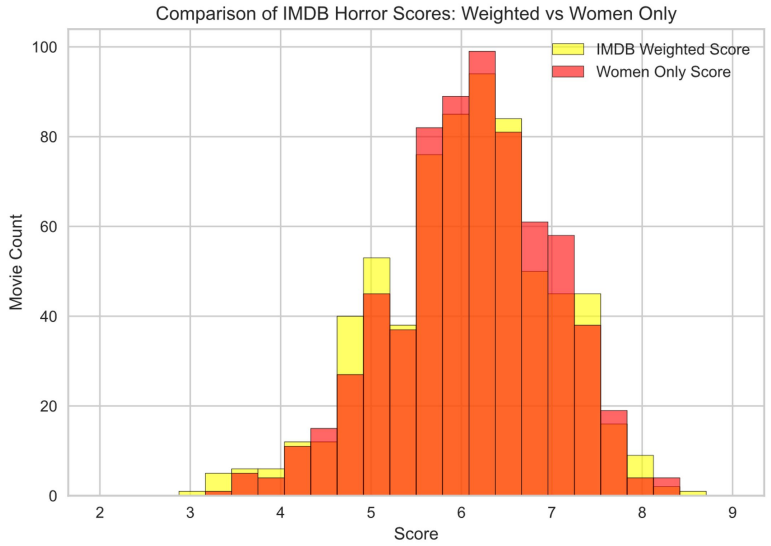
And a lot of votes

Only 17.5% Women’s Votes

The true horror is the lack of women

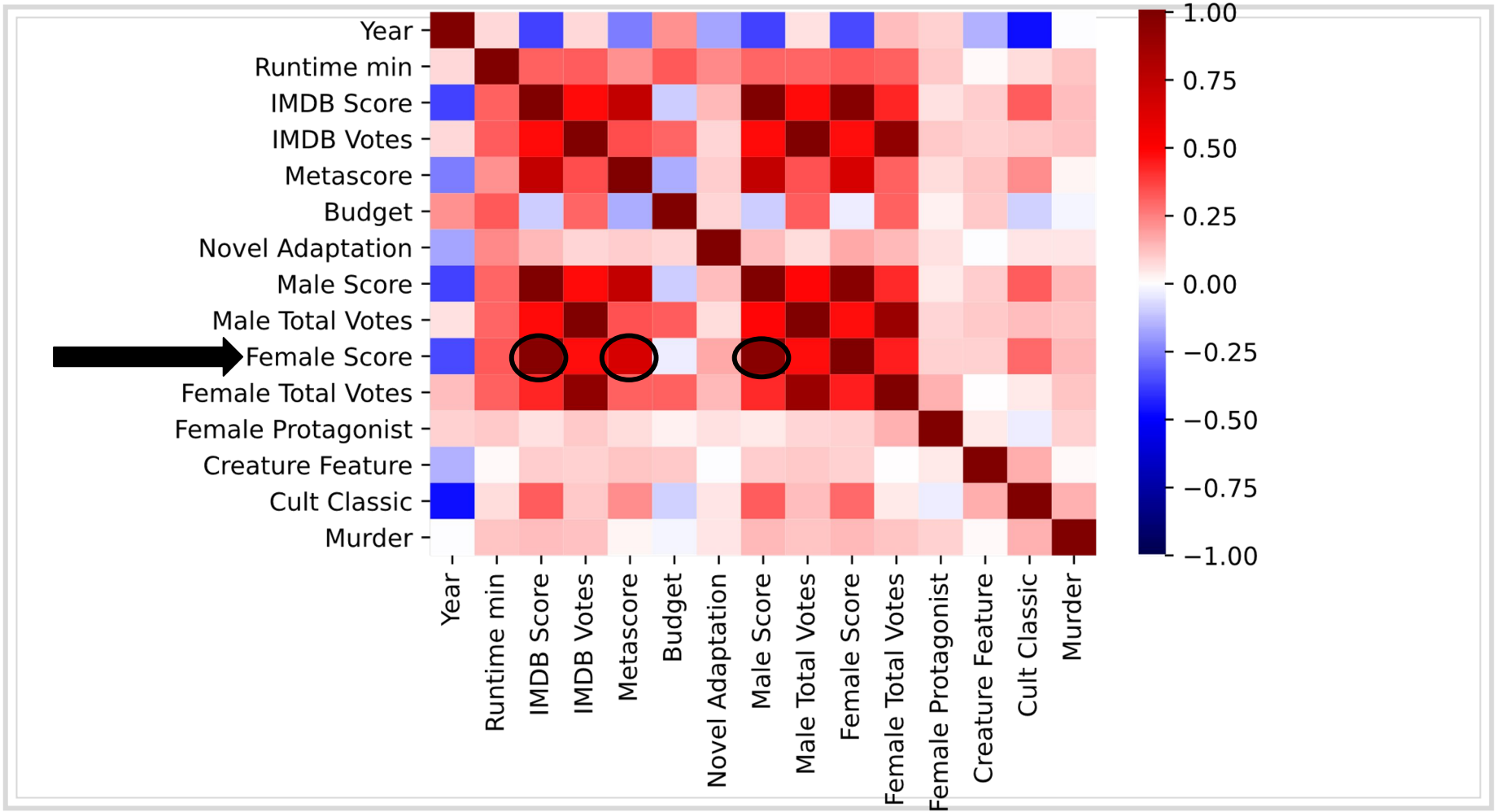

Comparison of IMDB Horror Scores for Men and Women
Men
Women
Movie Count
IMDB Score
0
20
40
60
80
100
2
3
4
5
6
7
8
9


Comparison of IMDB Horror Scores: Weighted vs Men Only
IMDB Weighted Score
Men Only Score
Movie Count
Score
0
20
40
60
80
100
2
3
4
5
6
7
8
9


Comparison of IMDB Horror Scores: Weighted vs Women Only
IMDB Weighted Score
Women Only Score
Movie Count
Score
0
20
40
60
80
100
2
3
4
5
6
7
8
9

Methodology

- Webscraping IMDB with BeautifulSoup
- Find correlations with target
- Feature selection based on potential use cases:
  - Previously released movies
  - Movies pending release
  - Pitching a new movie
- Linear Regression Modeling


Year
Runtime min
IMDB Score
IMDB Votes
Metascore
Budget
Novel Adaptation
Male Score
Male Total Votes
Female Score
Female Total Votes
Female Protagonist
Creature Feature
Cult Classic
Murder
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

Features

Numeric

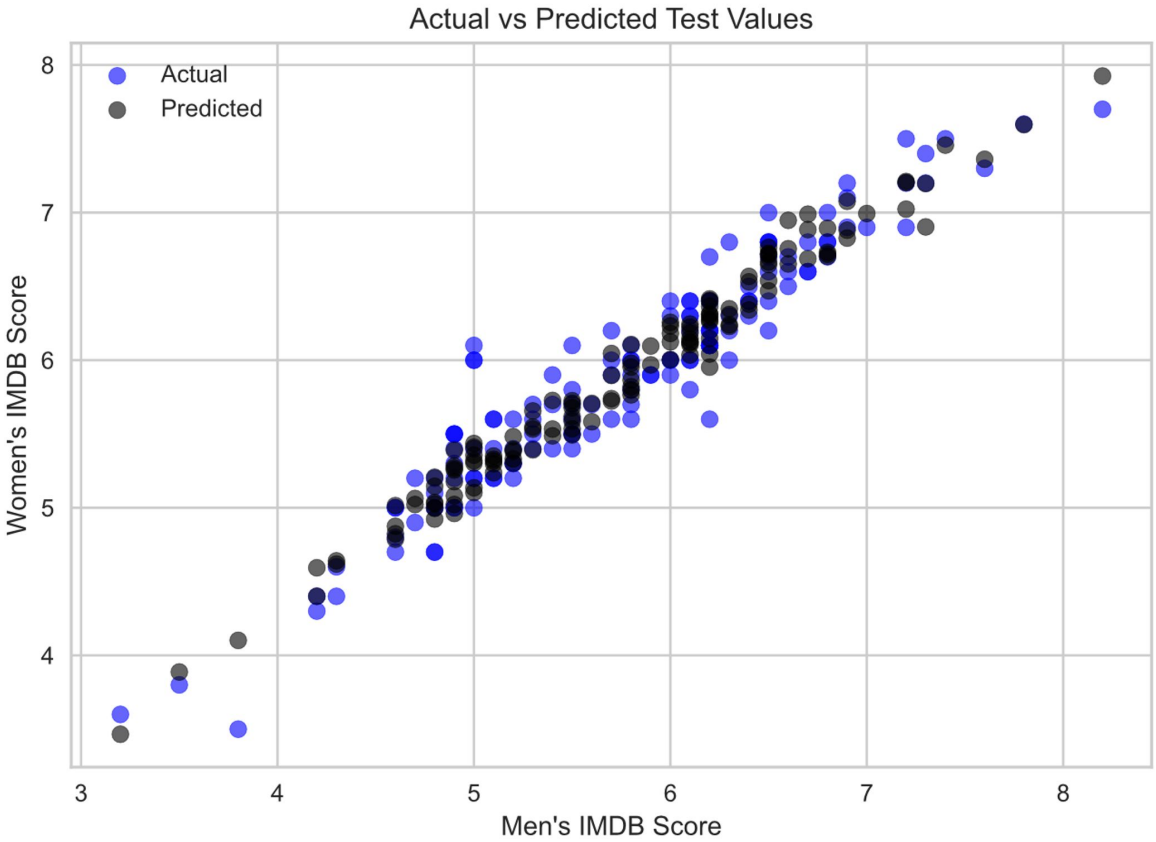
- Year
- Runtime (minutes)
- Male Score
- Metascore
- Budget

Categorical

- Director
- Genre
- Novel Adaptation
- Plot tags:
  - Monster
  - Cult Classic
  - Female Protagonist
  - Murder

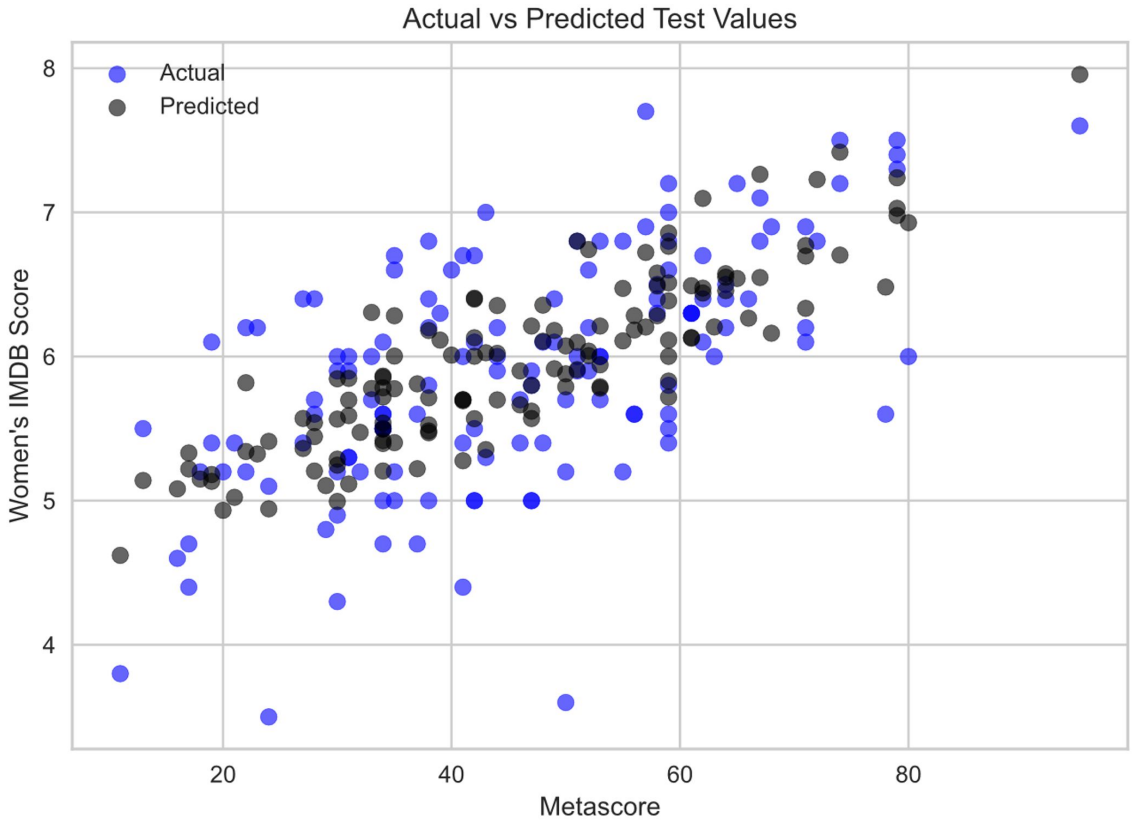
Predicting Score for Previously Released Movies

- Most predictive model
- Includes Male Score and Metascore
- Using Ridge Regression:
  - R^2: 0.926
- Highest Lasso Regression Coef:
  - Musical: 0.541
  - Male Score: 1.128


Actual vs Predicted Test Values
Actual
Predicted
Women's IMDB Score
Men's IMDB Score
8
7
6
5
4
3
4
5
6
7
8

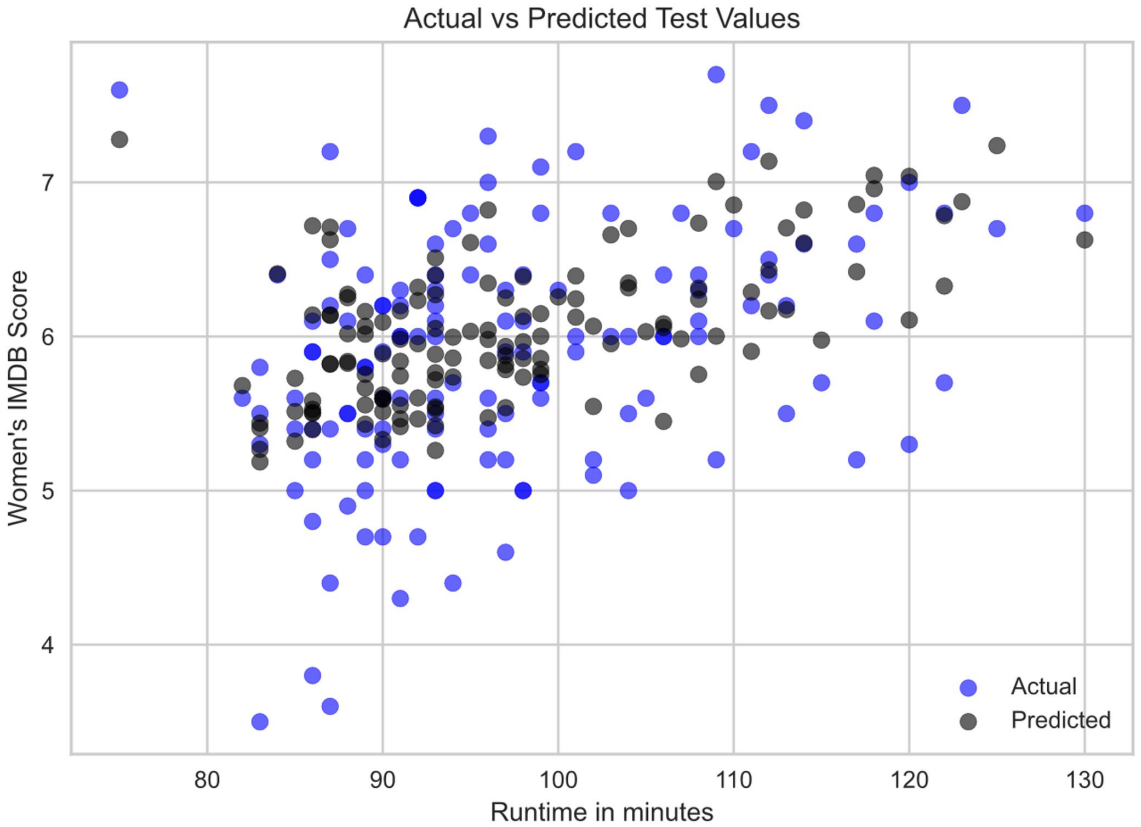
Predicting Score for Movies Pending Release

- Second most predictive model
- Includes Metascore
- Using Ridge Regression:
  - R^2: 0.516
- Highest Lasso Regression Coef:
  - Director James Wan: 0.768
  - Metascore: 0.734


Actual vs Predicted Test Values
Actual
Predicted
Women's IMDB Score
Metascore
8
7
6
5
4
20
40
60
80

Predicting Score for Movie Pitch

- Least predictive model
- Does not include audience or critic scores
- Using Ridge Regression:
  - R^2: 0.305
- Highest Lasso Regression Coef:
  - Director James Wan: 0.742
  - Runtime: 0.322


Actual vs Predicted Test Values
Women's IMDB Score
7
6
5
4
80
90
100
110
120
130
Runtime in minutes
Actual
Predicted

Conclusions

- The IMDB data I scraped was insufficient to predict the scores of a female audience without audience or critic features
- Movies that do well with a male audience and critics typically do well with female audiences
- Directors often had a higher correlation with scoring success than plot tags

Future Work

- Collect more data
- Add new features
- Narrow critic review scoring to female critics
- Test with different model types

thanks!

Any questions?

Here's the appendix

Breakdown on Male and Female Statistics

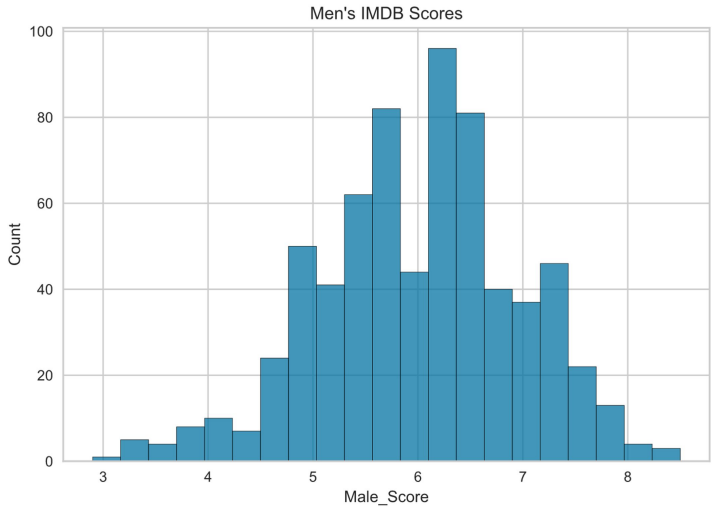
Looking at 680 horror films
43,612,742 Votes

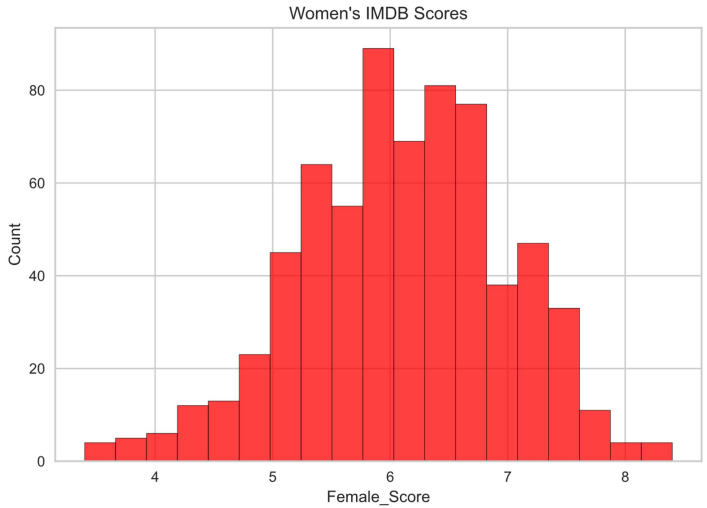
Men

- 82.5% of total votes
- Least votes: 3,105
- Most votes: 530,475
- Average difference between IMDB and Male Score: 0.04

Women

- 17.5% of total votes
- Least votes: 638
- Most votes: 124,287
- Average difference between IMDB and Female Score: 0.17


Men's IMDB Scores
Count
Male_Score
0
20
40
60
80
100
3
4
5
6
7
8

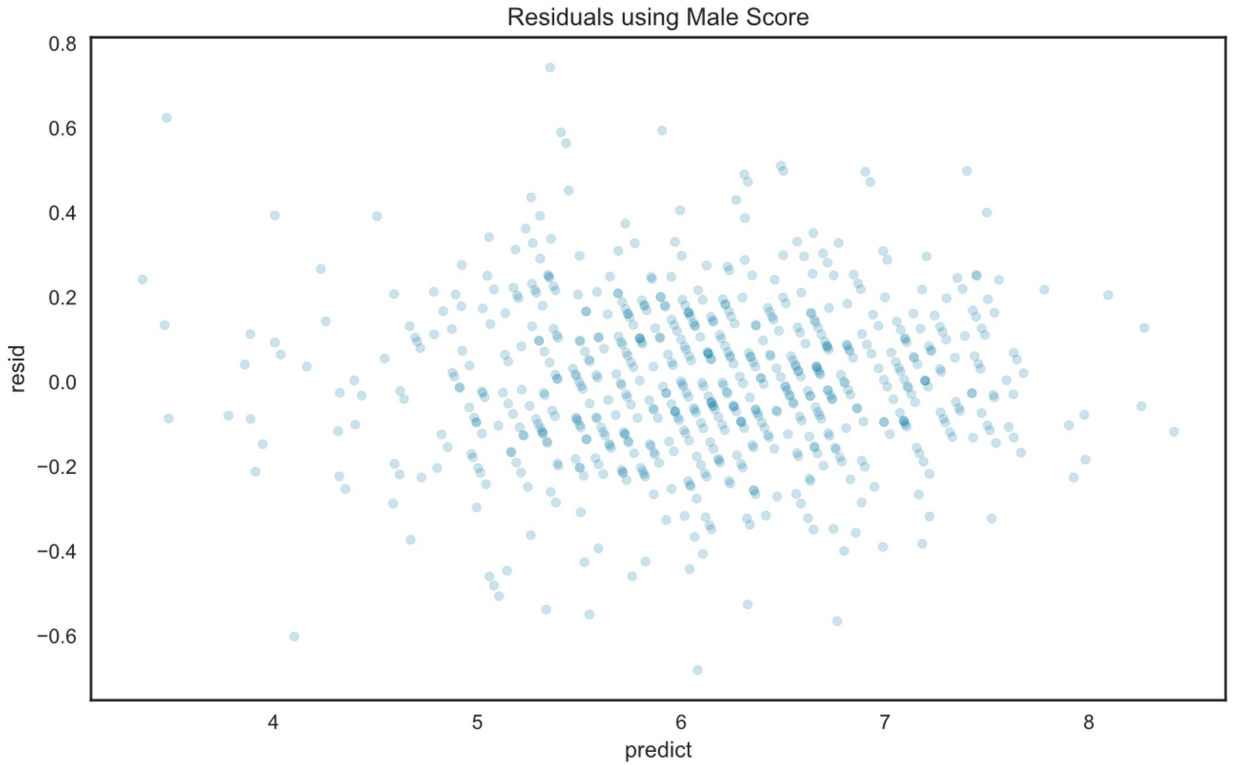

Women's IMDB Scores
Count
Female_Score
0
20
40
60
80
4
5
6
7
8

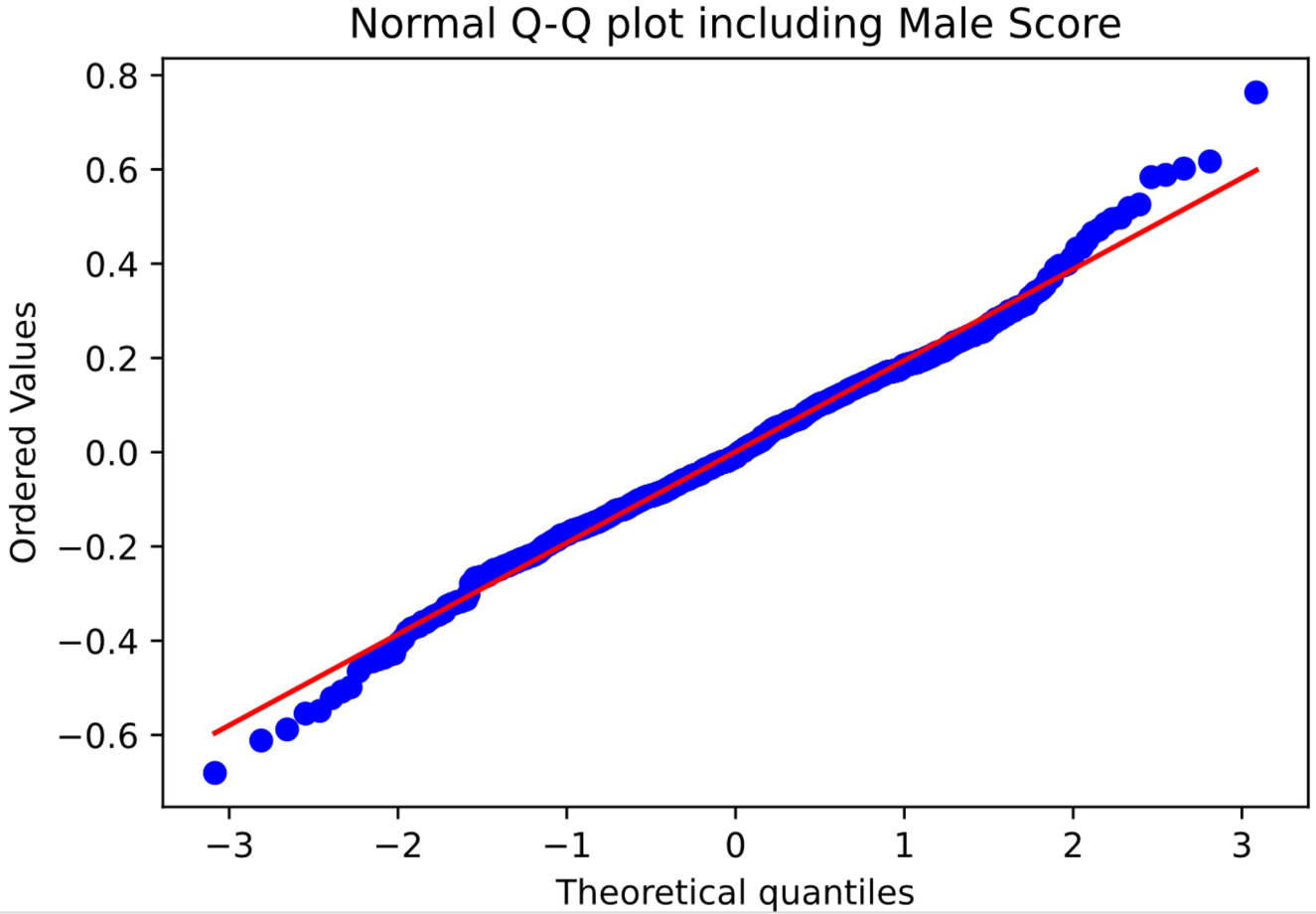
All Lasso Coefficients for Male Score

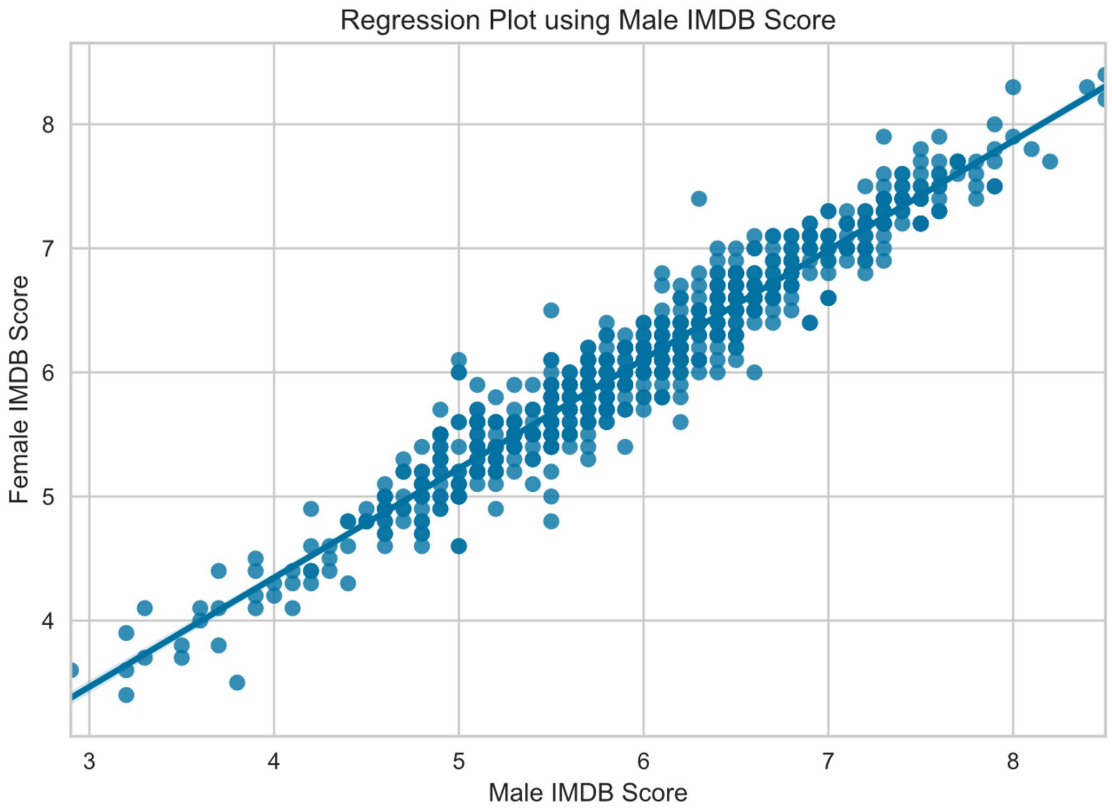
'Comedy', 0.00374410565170195),
('Thriller', 0.004771514908417107),
('Murder', 0.008526083346423472),
('Director_Other', 0.013393612405557413),
('Mystery', -0.01481949775418862),
('Action', 0.015546079956282256),
('Animation', 0.01791539548205807),
('Sci-Fi', -0.018447154828122606),
('Runtime_min', 0.019136440852901348),
('Creature_Feature', -0.025990712794288103),
('Director_Christopher Landon', 0.029258912742368498),
('Year', -0.033901339203013435),
('Cult_Classic', -0.03515161445435634),
('Crime', 0.038849364450716704),
('Director_James Wan', 0.053639977181636926),
('Drama', 0.05870140987944806),
('Novel_Adaptation', 0.06485839612701477),
('Female_Protagonist', 0.06508444462579362),
('Female_Protagonist', 0.06508444462579362),
('Director_John Carpenter', -0.06519478594882523),
('Director_Wes Craven', 0.06909392025773875),
('Director_Guillermo del Toro', 0.06940661932824925),
('Director_Darren Lynn Bousman', 0.07154678837645537),
('Fantasy', 0.0804360048057009),
('Director_William Brent Bell', 0.08291856812025027),
('Romance', 0.09864763918685579),
('Director_George A. Romero', -0.10599647025507941),
('Director_Sam Raimi', -0.10654228046664076),
('Biography', -0.11238492169999238),
('Metascore', -0.13476013151976446),
('Director_Tobe Hooper', -0.20775138076098412),
('Family', 0.20941716655494622),
('Director_Alexandre Aja', -0.2727310440675254),
('Director_Paul W.S. Anderson', 0.29625441073721337),
('Musical', 0.5413263228446936),
('Male_Score', 1.1280723854762331)

Predicting Score for Previously Released Movies

- Most predictive model
- Includes Male Score and Metascore
- Using Ridge Regression:
  - R^2: 0.926
  - Mean Absolute Error: 0.169
  - Mean Squared Error: 0.048
  - Root Mean Squared Error: 0.218
- Highest Lasso Regression Coef:
  - Musical: 0.541
  - Male Score: 1.128


Residuals using Male Score
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
resid
4
5
6
7
8
predict


Normal Q-Q plot including Male Score
Ordered Values
Theoretical quantiles
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
−3
−2
−1
0
1
2
3

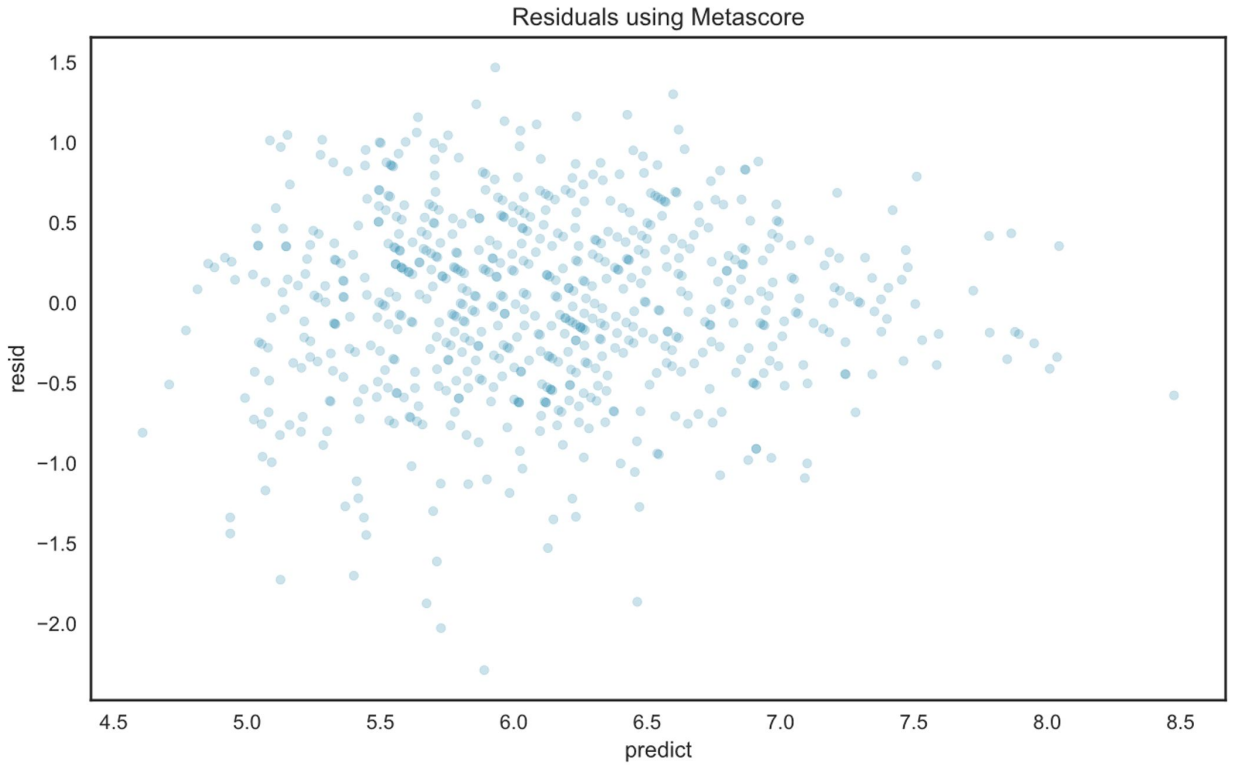

Regression Plot using Male IMDB Score
Female IMDB Score
Male IMDB Score
8
7
6
5
4
3
4
5
6
7
8

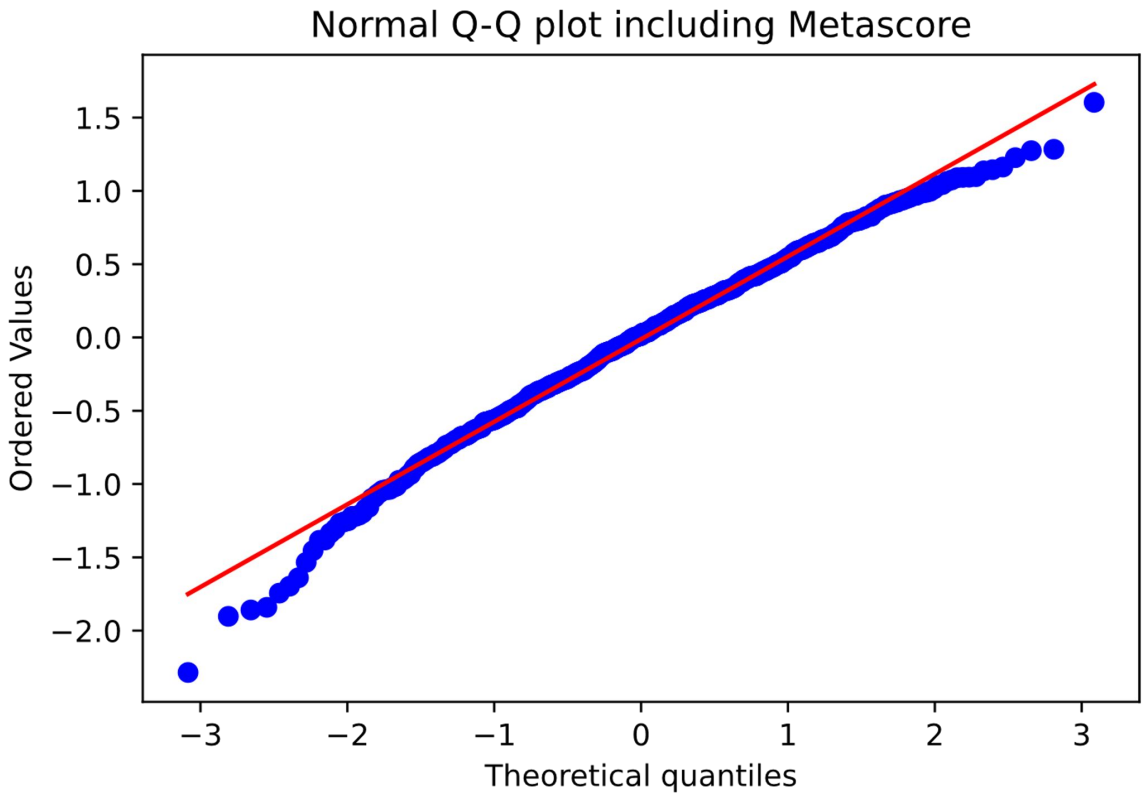
All Lasso Coefficients for Metascore

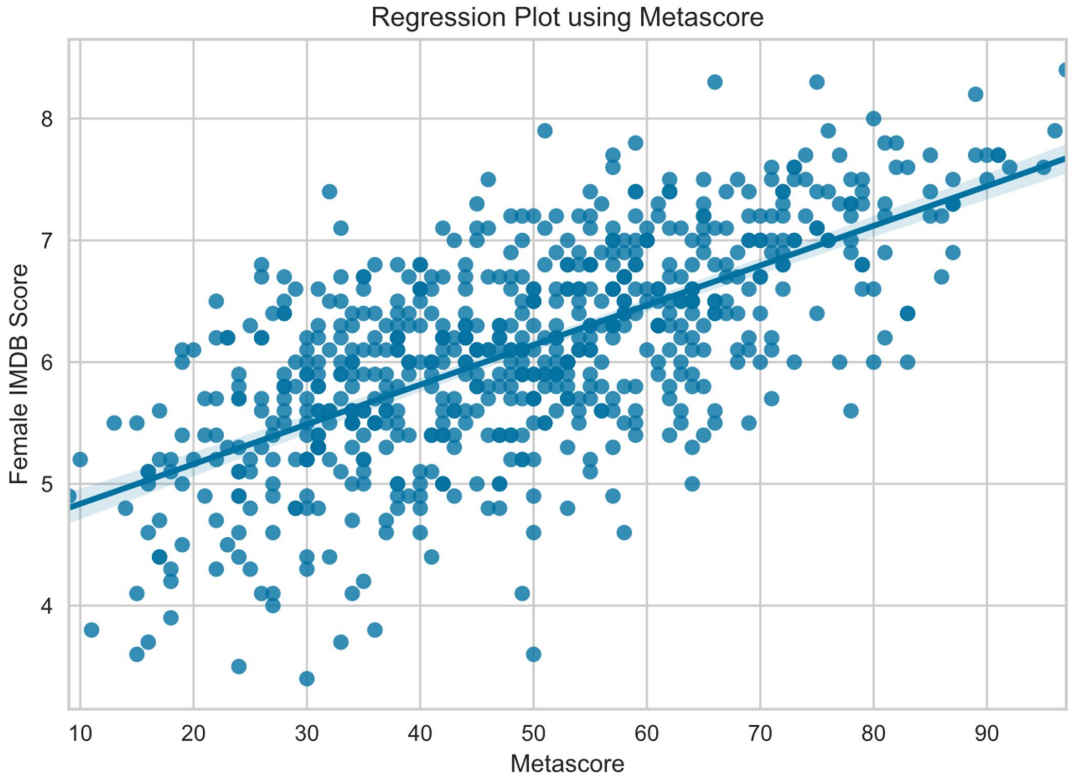
('Director_John Carpenter', 0.0017838609408893475),
('Cult_Classic', 0.018991606439711557),
('Director_Other', -0.024057576431460753),
('Budget', 0.024587684692083896),
('Drama', 0.02741904293375757),
('Sci-Fi', -0.045962849242831616),
('Creature_Feature', -0.06154201490506926),
('Thriller', -0.06299565039163672),
('Fantasy', 0.07559294576516423),
('Female_Protagonist', 0.07742710862982138),
('Mystery', -0.0839206238034574),
('Musical', 0.1011110759353892),
('Action', 0.10729240966099617),
('Adventure', -0.1078219179090507),
('Runtime_min', 0.17910877243625914),
('Crime', 0.18403131024712532),
('Murder', 0.18997513660319199),
('Director_George A. Romero', -0.1953199721637179),
('Director_Darren Lynn Bousman', 0.27277029244135514),
('Year', -0.30896439914855284),
('Director_Wes Craven', -0.32992911006449627),
('Metascore', 0.7338560631923502),
('Director_James Wan', 0.7680673769818154)

Predicting Score for Movies Pending Release

- Second most predictive model
- Includes Metascore
- Using Ridge Regression:
  - R^2: 0.516
  - Mean Absolute Error: 0.426
  - Mean Squared Error: 0.304
  - Root Mean Squared Error: 0.551
- Highest Lasso Regression Coef:
  - Director James Wan: 0.768
  - Metascore: 0.734


Residuals using Metascore
resid
predict
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5


Normal Q-Q plot including Metascore
Ordered Values
Theoretical quantiles
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−3
−2
−1
0
1
2
3

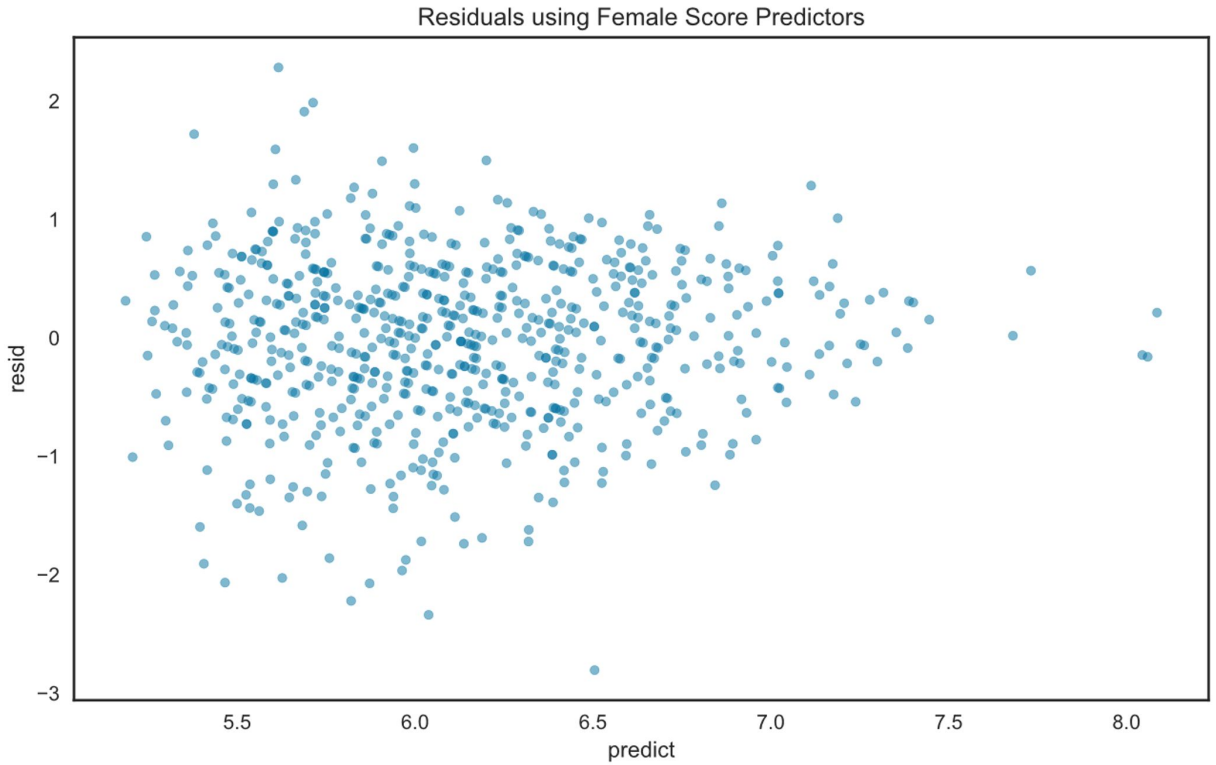

Regression Plot using Metascore
Female IMDB Score
8
7
6
5
4
10
20
30
40
50
60
70
80
90
Metascore

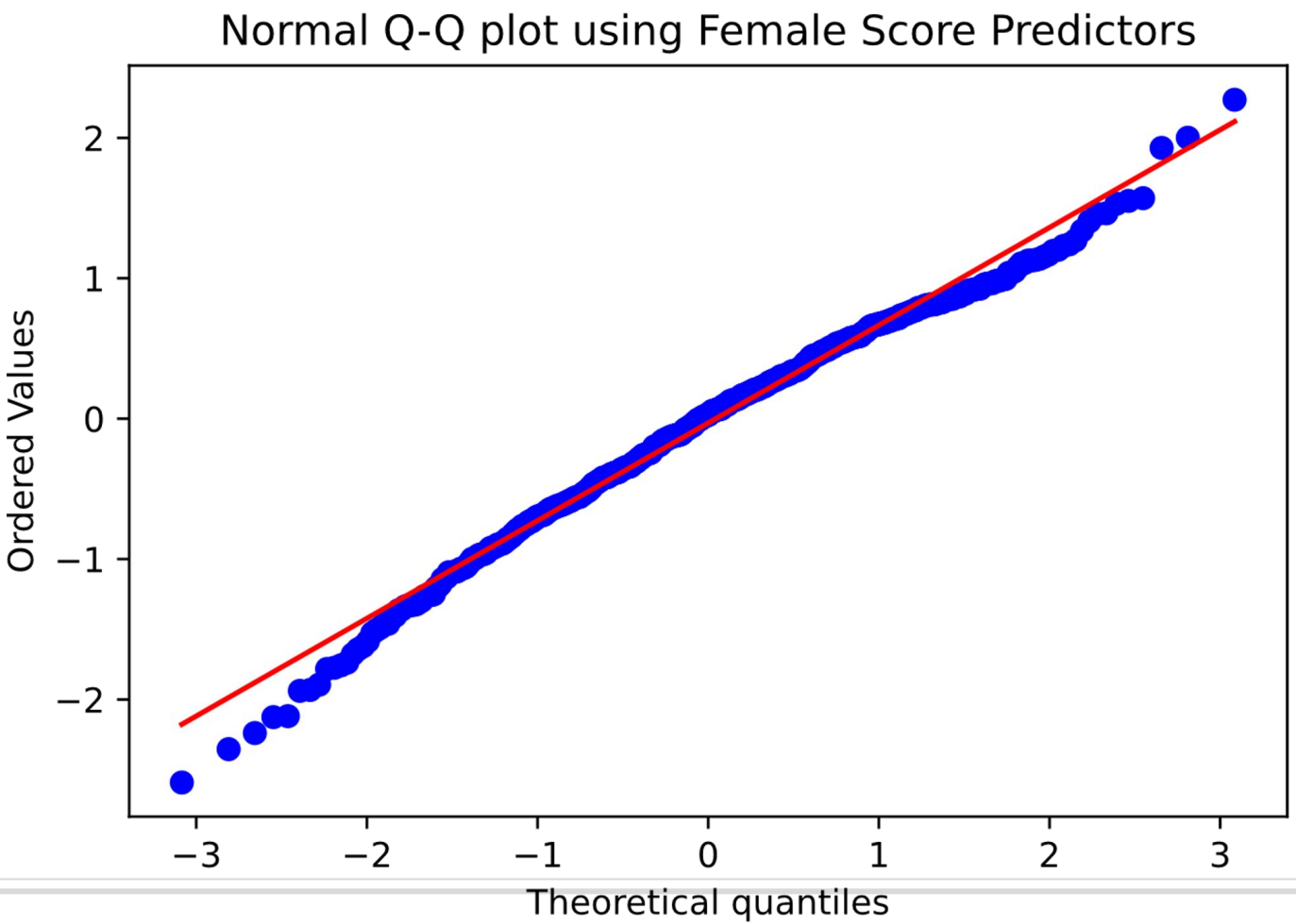
All Lasso Coefficients for Female Score Predictors

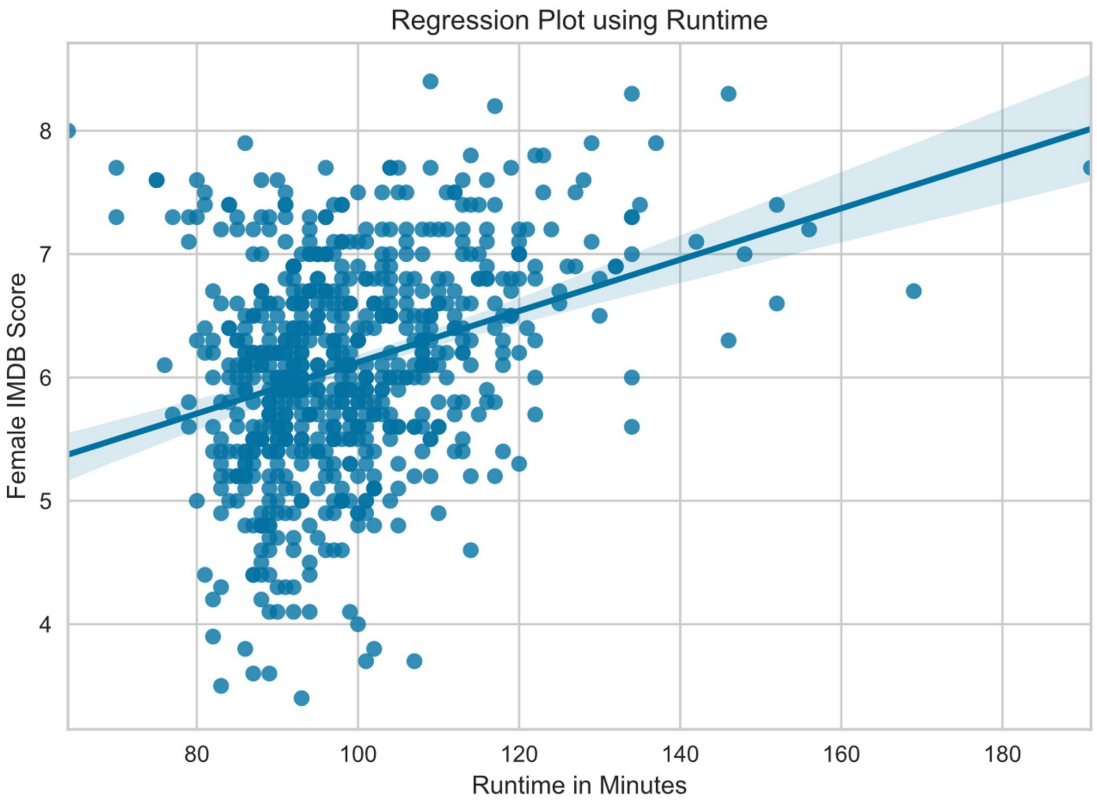
('Director_Mike Flanagan', 0.017684388867366313),
('Director_Christopher Landon', 0.020140161357188345),
('Novel_Adaptation', 0.022799151304034978),
('Fantasy', 0.033696773997248936),
('Thriller', -0.039697023358966965),
('Sci-Fi', 0.050388893372888426),
('Action', 0.055930292546503654),
('Budget', -0.059730197402427826),
('Mystery', -0.060381835900018645),
('Director_George A. Romero', -0.06537526623229101),
('Director_Guillermo del Toro', 0.06805521513631949),
('Comedy', 0.08570427168757999),
('Cult_Classic', 0.09422032727044077),
('Director_Sam Raimi', 0.10498769612843115),
('Crime', 0.1180425836861281),
('Murder', 0.172297996028574),
('Director_Other', -0.17363995852834108),
('Adventure', -0.17606758804044692),
('Female_Protagonist', 0.20685392425425908),
('Horror', -0.2211880308445127),
('Director_Tim Burton', 0.23800825465375502),
('Drama', 0.24088177411667716),
('Director_Rob Zombie', -0.29323922341620456),
('Runtime_min', 0.3223350267468774),
('Animation', 0.3529213541385356),
('Musical', 0.4448906856631793),
('Year', -0.45624389415144156),
('Director_Wes Craven', -0.4681529931909872),
('Director_James Wan', 0.742874789797115

Predicting Score for Movie Pitch

- Least predictive model
- Does not include audience or critic scores
- Using Ridge Regression:
  - R^2: 0.305
  - Mean Absolute Error: 0.510
  - Mean Squared Error: 0.433
  - Root Mean Squared Error: 0.658
- Highest Lasso Regression Coef:
  - Director James Wan: 0.742
  - Runtime: 0.322


Residuals using Female Score Predictors
resid
predict
2
1
0
−1
−2
−3
5.5
6.0
6.5
7.0
7.5
8.0


Normal Q-Q plot using Female Score Predictors
Ordered Values
Theoretical quantiles
2
1
0
−1
−2
−3
−2
−1
0
1
2
3


Regression Plot using Runtime
Female IMDB Score
8
7
6
5
4
80
100
120
140
160
180
Runtime in Minutes

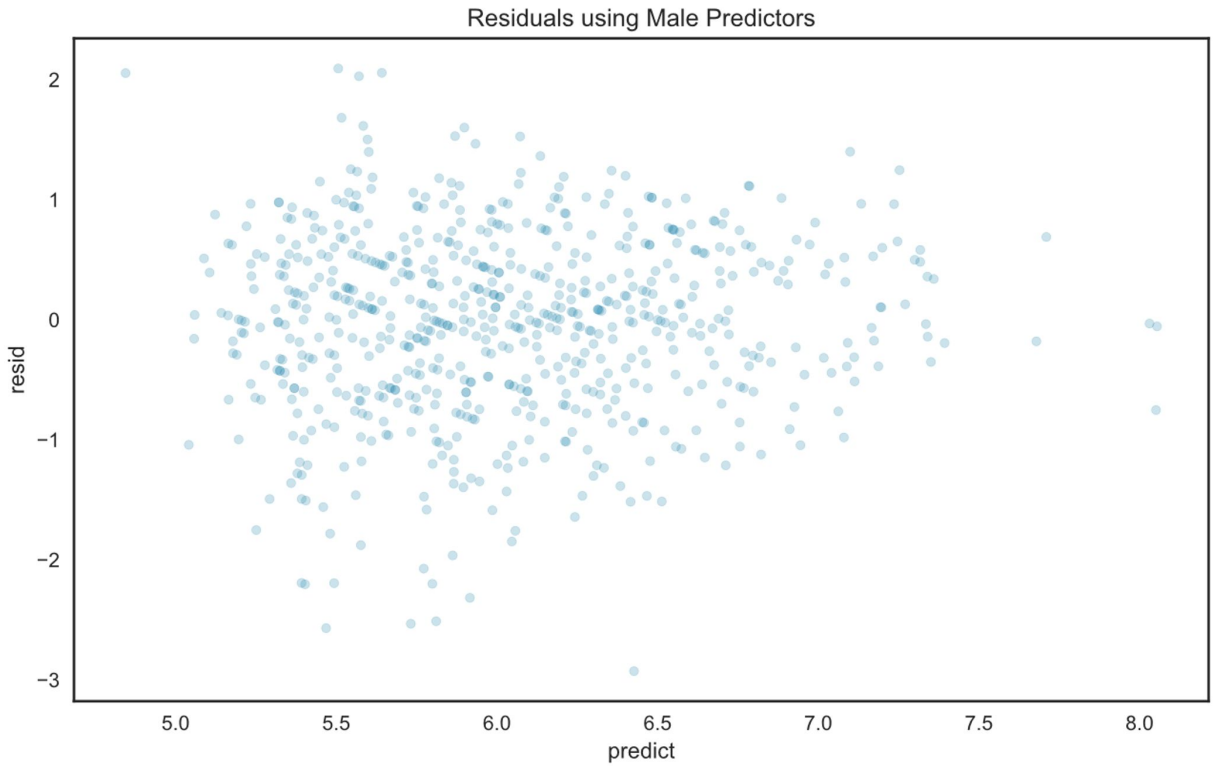
Predicting Score for Movie Pitch for male audience

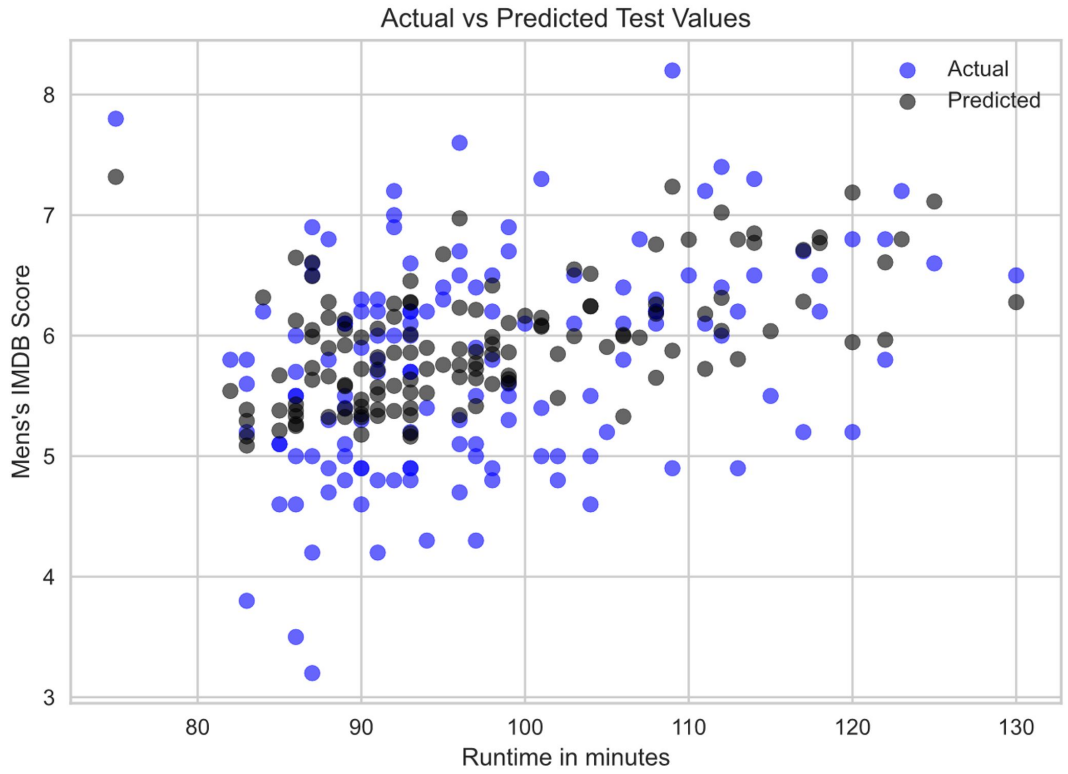
- Least predictive model
- Does not include audience or critic scores
- Using Ridge Regression:
  - R^2: 0.292
  - Mean Absolute Error: 0.588
  - Mean Squared Error: 0.549
  - Root Mean Squared Error: 0.741
- Highest Lasso Regression Coef:
  - Director James Wan: 0.499
  - Runtime: 0.357

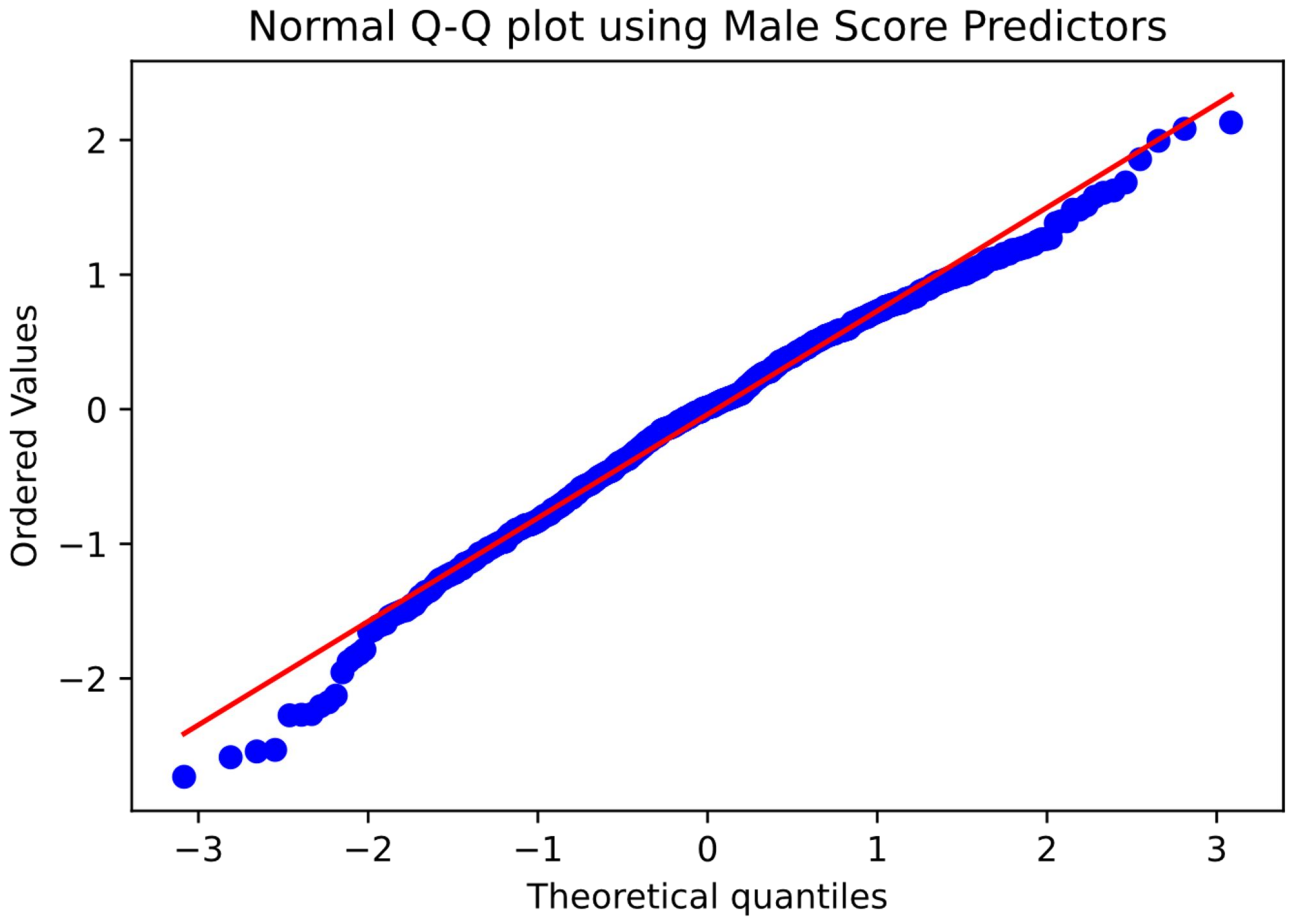
All Lasso Coefficients for Male Score Predictors

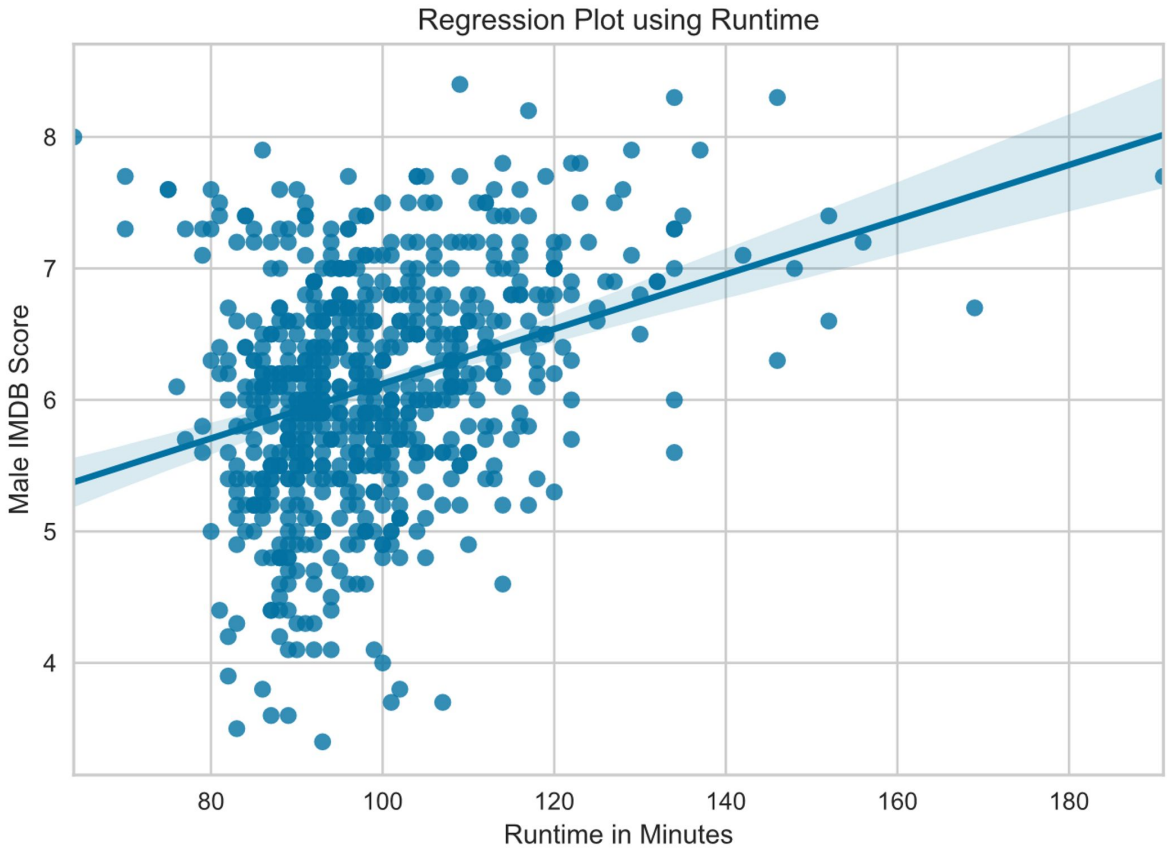
('Director_David Cronenberg', 0.013163179791430538),
('Director_Mike Flanagan', 0.021490328529226863),
('Mystery', -0.022894196068932098),
('Thriller', -0.029969965004991425),
('Creature_Feature', 0.037678761998297734),
('Action', 0.05732271898846393),
('Director_Guillermo del Toro', 0.06991949625237483),
('Crime', 0.08216891744084677),
('Director_John Carpenter', 0.085841681065091),
('Comedy', 0.10515232381089208),
('Budget', -0.11792814002583467),
('Sci-Fi', 0.12062268185175508),
('Cult_Classic', 0.15479692204896695),
('Female_Protagonist', 0.1628642691567626),
('Murder', 0.1631754499044167)

('Adventure', -0.17662525255856745),
('Drama', 0.23248704569682294),
('Director_Other', -0.23850667330371042),
('Horror', -0.25304344358777947),
('Director_William Brent Bell', -0.2878388386961035),
('Director_Rob Zombie', -0.3263253033875819),
('Animation', 0.3371014792062087),
('Runtime_min', 0.3588595859325505),
('Director_Sam Raimi', 0.36360426868781337),
('Director_Tim Burton', 0.4429430064344802),
('Year', -0.467049560530619),
('Director_Wes Craven', -0.6297642065193516),
('Director_James Wan', 0.6773651624393858)


Residuals using Male Predictors
resid
predict
2
1
0
−1
−2
−3
5.0
5.5
6.0
6.5
7.0
7.5
8.0


Actual vs Predicted Test Values
Actual
Predicted
Mens's IMDB Score
Runtime in minutes
8
7
6
5
4
3
80
90
100
110
120
130


Normal Q-Q plot using Male Score Predictors
Ordered Values
Theoretical quantiles
2
1
0
−1
−2
−3
−2
−1
0
1
2
3


Regression Plot using Runtime
Male IMDB Score
8
7
6
5
4
80
100
120
140
160
180
Runtime in Minutes