

Bechdel Test & Films:

Are there early signs?





Female Representation in Film



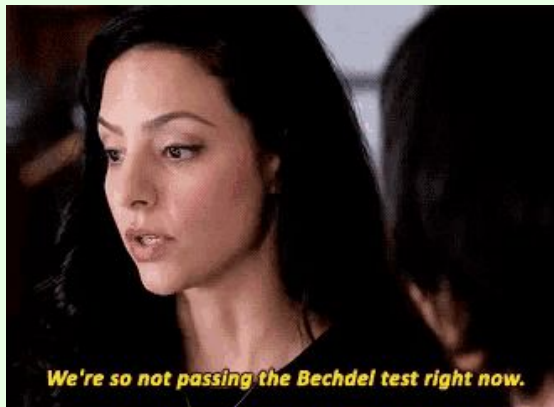
What is the Bechdel Test? Why does it matter?

Historically, women have been under or poorly represented in U.S. films.

- Studies show that male characters consistently outnumber female characters in speaking roles and lead roles.
- Even when women are present, their roles often revolve around men, romantic interests, mothers, or supporting characters

In 1985, Alison Bechdel introduced the Bechdel Test as a simple way to highlight gender bias in film.

- A movie passes if it has two named women who talk to each other about something other than a man
- While it's not a perfect measure, the Bechdel Test sparked wider conversation about representation in media and remains a cultural reference point in gender equity discussions





Examples of movies that passed!



Examples of movies that failed...





Research Questions:

1

Is there a way to predict whether a movie passes the Bechdel Test based off of production attributes?

2

What features are most important in ensuring whether a movie passes the Bechdel Test?

3

Do recent movies do better than those made prior to the test's release (1985)? Does the invention of the test impact overall trends?



Dataset Preparation

**Kaggle's "9000+ Movies:
IMDb and Bechdel" dataset**

**FiveThirtyEight GitHub
"Bechdel Test" dataset**

**Merged both datasets, using
movie title as merge key**

Engineered features:
Total_gross, profit, release decade,
(pre/post Bechdel), and bechdel_pass

One Final Dataset



Our Data

	release_year	bechdel_rating	imdb_average_rating	duration	genre	budget	domestic_gross	international_gross	decade	bechdel_pass	period	total_gross	profit
title													
(500) Days of Summer	2009	1	7.7	95	Comedy	7500000	32391374.0	60803210.0	2000	0	post-bechdel	93194584.0	85694584.0
10 Things I Hate About You	1999	3	7.3	97	Comedy	13000000	38177966.0	60414025.0	1990	1	post-bechdel	98591991.0	85591991.0
12 Years a Slave	2013	3	8.1	134	Biography	20000000	53107035.0	158607035.0	2010	1	post-bechdel	211714070.0	191714070.0
127 Hours	2010	3	7.5	94	Biography	18000000	18335230.0	60735230.0	2010	1	post-bechdel	79070460.0	61070460.0
13 Going on 30	2004	3	6.3	98	Comedy	30000000	57139723.0	96439723.0	2000	1	post-bechdel	153579446.0	123579446.0
1408	2007	3	6.8	104	Fantasy	22500000	71985628.0	131263370.0	2000	1	post-bechdel	203248998.0	180748998.0
17 Again	2009	3	6.4	102	Comedy	40000000	64167069.0	139474906.0	2000	1	post-bechdel	203641975.0	163641975.0
1776	1972	1	7.6	141	Drama	4000000	NaN	NaN	1970	0	pre-bechdel	0.0	-4000000.0
2 Fast 2 Furious	2003	1	5.9	107	Action	76000000	127120058.0	236220058.0	2000	0	post-bechdel	363340116.0	287340116.0
2 Guns	2013	1	6.7	109	Action	61000000	75612460.0	132493015.0	2010	0	post-bechdel	208105475.0	147105475.0
2012	2009	1	5.8	158	Action	200000000	166112167.0	788408539.0	2000	0	post-bechdel	954520706.0	754520706.0
2046	2004	3	7.4	129	Drama	12000000	1442338.0	19202856.0	2000	1	post-bechdel	20645194.0	8645194.0
21	2008	3	6.8	123	Crime	35000000	81159365.0	157852532.0	2000	1	post-bechdel	239011897.0	204011897.0
21 & Over	2013	1	5.8	93	Comedy	13000000	25682380.0	42195766.0	2010	0	post-bechdel	67878146.0	54878146.0
21 grams	2003	3	7.6	124	Crime	20000000	16248701.0	59667625.0	2000	1	post-bechdel	75916326.0	55916326.0



Groups to Focus on

	release_year	bechdel_rating	imdb_average_rating	duration	genre	budget	domestic_gross	international_gross	decade	bechdel_pass	period	total_gross	profit
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3 groups: Release Decade, Bechdel pass, and pre/post-bechdel

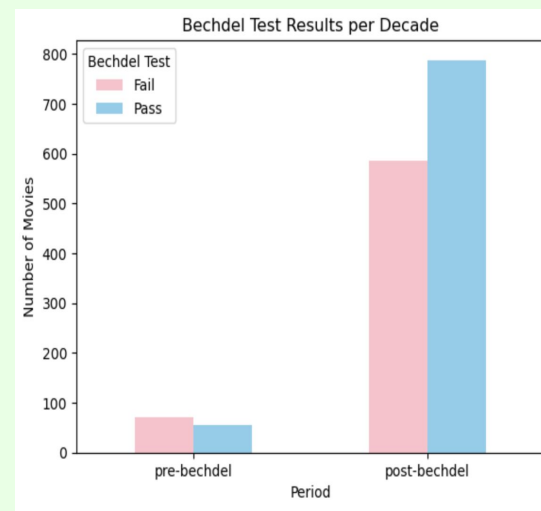
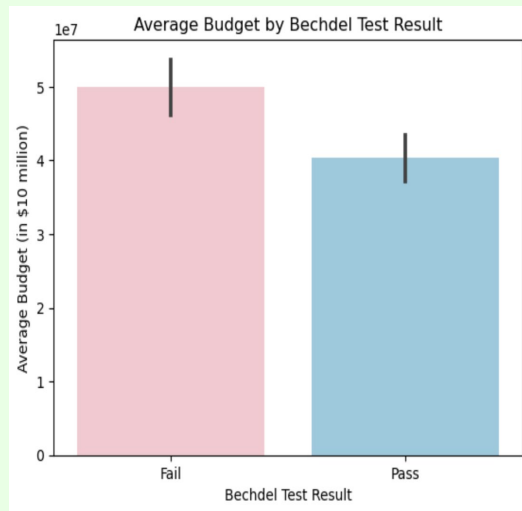
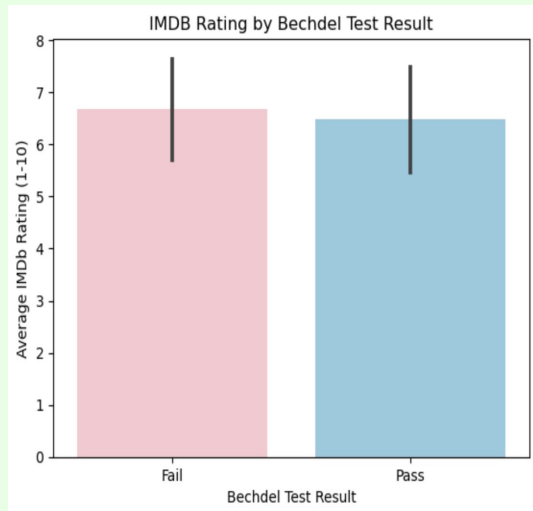


Features to Focus on

	release_year	bechdel_rating	imdb_average_rating	duration	genre	budget	domestic_gross	international_gross	decade	bechdel_pass	period	total_gross	profit
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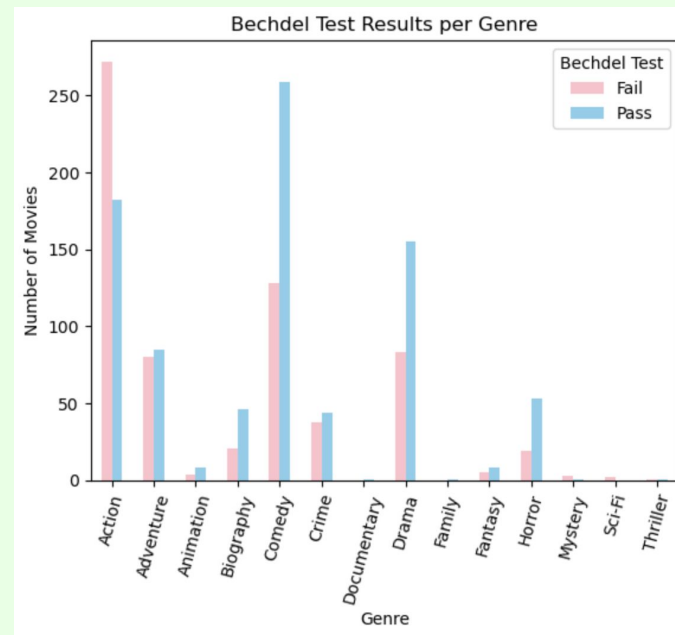
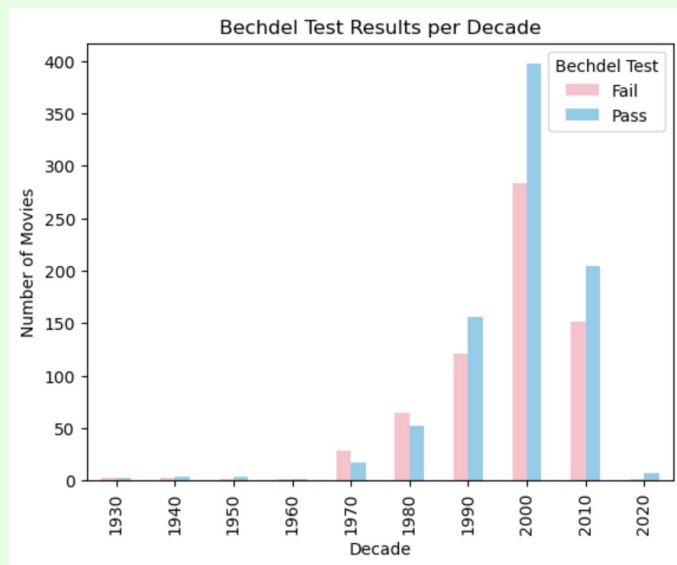
5 features: IMBd rating, Duration, Genre, Budget, and Profit

Data Visualizations



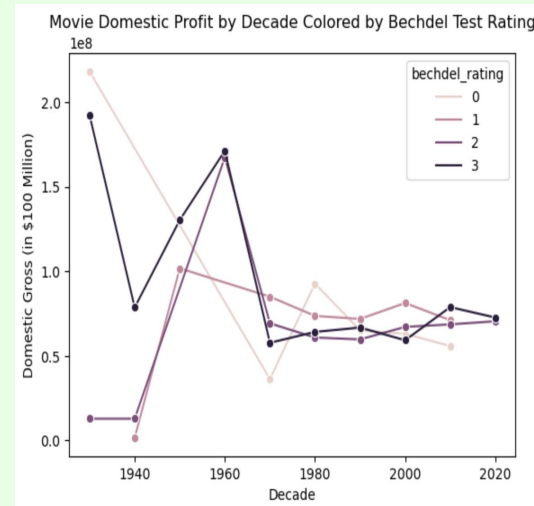
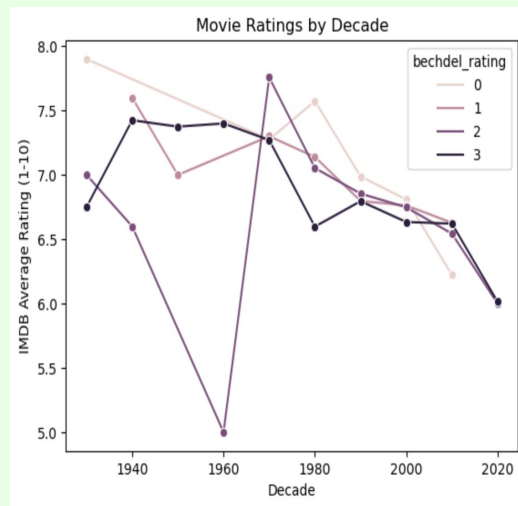
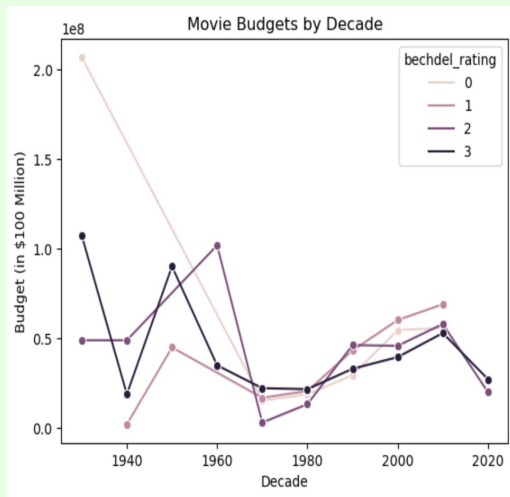
- There is little difference in IMBb rating between movies that have failed vs passed
- There is a small difference in Budget between movies that have failed vs passed
- Pre-Bechdel: proportion of movies that failed is slightly higher than those who passed
- Post-Bechdel: proportion of movies that passed is much greater than those who failed

Data Visualizations



- There is low representation of movies release before 1980 and after 2010 within our dataset
- There is low representation for movies that are NOT in the action or comedy category
- Action movies are the only ones with more movies that have failed the Bechdel test than passed

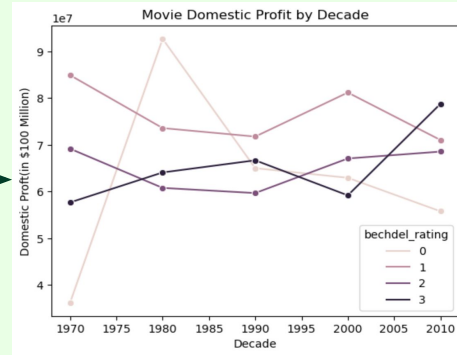
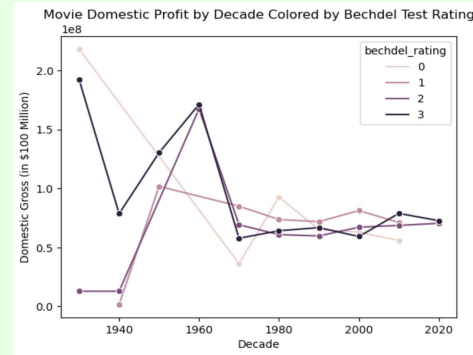
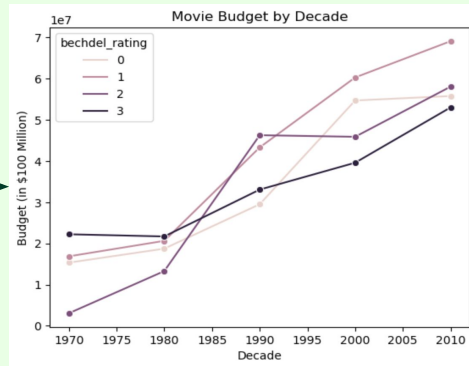
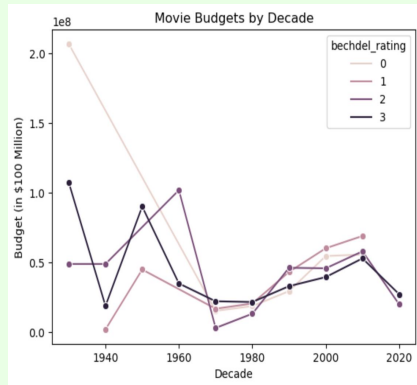
Data Visualizations



- Volatility across all 3 graphs between movies within release decades of 1930s-1950s
- **Budget:** films that pass Bechdel test had a similar trend to films that failed
- **IMBd Rating:** films that passed maintained a slightly higher rating than films that failed
- **Domestic Gross Revenue:** There is no clear trend between films that passed and films that failed

Key Takeaways

- **Gender representation and production success can coexist:** From the 1970s onward, films that pass the Bechdel Test show comparable or stronger performance in budget, ratings, and profits
- **Drop-Off Before 1980s and after 2010s:** Data during then appeared **incomplete or inconsistent**, possibly due to recency or limited availability, impacting the reliability of analysis.
- **Filtering Dataset to Reduce Noise:** excluding movies released before 1980s and after 2010s for further analyses and better trend visibility





Decision Tree Classifier

Model	Dataset	Accuracy	Precision (0 / 1)	Recall (0 / 1)	F1-Score (0 / 1)
Decision Tree	Full	0.597	0.52 / 0.65	0.50 / 0.67	0.51 / 0.66
	Filtered	0.597	0.49 / 0.64	0.34 / 0.77	0.40 / 0.70
Including Genre	Full	0.633	0.57/0.67	0.49/0.74	0.53/0.70

- Achieved **59.7%-63.3% accuracy** across both the full and filtered dataset
- Performed better at **identifying movies that passed** the Bechdel Test (class 1)
- Filtering improved **recall for passing movies** (from 0.67 to 0.77) but hurt recall for failing ones
- When including genre, accuracy improved (to 0.633), but bias toward class 1 remained



Random Forest Classifier

Model	Dataset	Accuracy	Precision (0 / 1)	Recall (0 / 1)	F1-Score (0 / 1)
Random Forest	Full	0.587	0.51 / 0.64	0.48 / 0.67	0.49 / 0.65
	Filtered	0.569	0.46 / 0.65	0.49 / 0.62	0.48 / 0.63
Including Genre	Full	0.637	0.57/0.68	0.52/0.72	0.55/0.70

- Achieved **56.9%-58.7% accuracy** across both the full and filtered dataset
- Including genre in the model boosted accuracy to the highest level (63.7%)
- Model still struggles to predict class 0 (identifying movies that fail)



Logistic Regression

Model	Dataset	Accuracy	Precision (0 / 1)	Recall (0 / 1)	F1-Score (0 / 1)
Logistic Regression	Full	0.613	0.60 / 0.62	0.23 / 0.89	0.33 / 0.73
	Filtered	0.597	0.49 / 0.63	0.28 / 0.81	0.36 / 0.71
Including Genre	Full	0.633	0.58/0.66	0.48/0.74	0.53/0.70

- Achieved **59.7%-61.3% accuracy** across both the full and filtered dataset (containing highest accuracy for the full dataset)
- Strong recall for passing movies (89%) but poor at identifying failing ones
- Including genre improved balance slightly (brings accuracy up to 63.3%)



K-nearest neighbors (KNN)

Model	Dataset	Accuracy	Precision (0 / 1)	Recall (0 / 1)	F1-Score (0 / 1)
KNN (no scaling)	Full	0.587	0.51 / 0.64	0.47 / 0.67	0.49 / 0.65
	Filtered	0.576	0.47 / 0.66	0.52 / 0.62	0.49 / 0.64
KNN (with scaling)	Full	0.577	0.50 / 0.62	0.42 / 0.69	0.45 / 0.65
	Filtered	0.522	0.41 / 0.61	0.44 / 0.58	0.42 / 0.59

- Without scaling: 57.6%-58.7% accuracy
- With Scaling: 52.2%-57.7% accuracy (drop-off with scaling)
- Overall, filtering the data slightly decreases accuracy



General Observations

- Including the 'Genre' feature consistently improved performance across both Decision Tree and Random Forest classifiers
- **Best Overall Model Performer** 🌲: Random Forest with Genre outperformed all other models, achieving the highest accuracy (63.7%)
- **Worst overall Model Performer** 🏠: KNN performed worse than tree-based models in all settings. Even at its best (no scaling, full dataset), KNN only reached an accuracy of 58.7%
- **Filtering data didn't consistently improve model performance** (often lowered accuracy and hurt recall for class 0)





Conclusions

Answering our Research questions:

- **Is there a way to predict whether a movie passes the Bechdel Test based off of production attributes?**
 - Sort of... Our models maintained around a 60% prediction accuracy, which is a moderately successful model
- **What features are most important in ensuring whether a movie passes the Bechdel Test?**
 - Genre is the most impactful feature, followed by release year and budget
- **Do recent movies do better than those made prior to the test's release (1985)? Does the invention of the test impact overall trends?**
 - Not conclusive... Our data sparsity in movies pre-Bechdel test led to difficulty in observing trends.
 - Previous visualizations suggest more Bechdel test passes in later decades so...maybe!





Potential Next Steps

- **Building a stronger dataset:** Balancing the number of movies within each release decade
- **Focusing more on categorical features:** Genre was clearly indicative of pass/fail.. could director gender, cast gender proportions, and production studio strengthen the prediction?
- **Expanding to other measures of representation:** Gender representation tests similar to the Bechdel test was difficult due to unpopularity. What if we explored race or LGBTQ+ representation tests?



Thank you!



References

Datasets:

- [Movies Dataset \(movies.csv\)](#)
- [9000+ Movies : IMDb and Bechdel \(Bechdel_IMDB_Merge0524.csv\)](#)

Lit Review:

Lindner, Andrew M., Melissa Lindquist, and Julie Arnold. "Million Dollar Maybe? The Effect of Female Presence in Movies on Box Office Returns." *Sociological Inquiry* 85, no. 3 (March 14, 2015): 407–28. <https://doi.org/10.1111/soin.12081>.

Valentowitsch, Johann. "Does Female Screen Presence Pay off at the Box Office? An Exploratory Analysis with Special Emphasis on the Bechdel Test." *Journal of International Business and Economics* 22, no. 1 (March 1, 2022): 40–69. <https://doi.org/10.18374/jibe-22-1.4>.

Waters, Terri. "7 Tests (That Aren't the Bechdel Test) That Measure Movies for Gender Equality and Representation." *The Unedit*, January 23, 2019. <https://www.the-unedit.com/posts/2018/8/20/7-tests-that-arent-the-bechdel-test-that-measure-movies-for-gender-equality-and-representation>.