# Can you predict the movie’s genre based off of a movie poster better than a Machine Learning Model?

Movie posters represent first impression many of us have with a film. It needs to catch audiences’ attention and try to convince us to purchase a ticket. Moreover, with how much production companies spend on marketing, about half of the movie’s budget, they typically want to go with tried and true methods when designing their poster. This is what leads a lot of movie posters to feel the similar. The YouTube channel ‘Cheddar’ explores come of the common cliques that movie poster’s use in their video “*Why All Movie Posters Look the Same - Cheddar Explains*”. This was an interesting idea to me, if posters can convey story, themes and genre at a glance; would you be able to teach a deep machine learning model to predict a movies genre based off of sole a movie poster?

## How Does the Model Work?

The type of model that I used for this problem is referred to as a Convolutional Neural Network or CNN (not the broadcaster). If you are interested in this type of model, I am going to link to you to a nonpremium medium article at the bottom of this article. This is a gross oversimplification on how the model works:

A picture containing room

Description automatically generated

In the model’s “brain” is a network of nodes (neurons) that are connected by edges (neural pathways). The images of movie poster get broken down into paint-by-number renditions of themselves. The model then looks through a magnifying glass and begins to learn the numbers associated with different chunks of the poster. After it slides the magnifying glass across the entire image, the model makes a guess as to which genres it believes the film belongs to. If it correctly guesses then those neural pathways strengthen and if it is incorrect it strengthens other neural pathways. This process is repeated for thousands of movie posters examples until the model becomes confident in its ability to predict the movie genre of a movie poster.

## The Movie Poster Dilemma

In the Youtube channel Cheddar’s Video *Why All Movie Posters Look the Same - Cheddar Explains* they discuss the clichés of Romantic Comedies movies put the two lead stars’ back-to-back to signal to the audience about the impending conflict between the main character and their love interest. Well people have been conditioned to recognize this movie poster style as a romcom that is only half the problem. Movie genre can be a little more nuance than that for example:

A person with collar shirt

Description automatically generated

Given these two posters have their lead stars standing back-to-back the majority of people would correctly guess these movies are romcoms. However, *No Reservations* is considered a romcomdram while *How to Lose A Guy in 10 Days* is only considered a romcom. The movie posters do not always convey the genre of a film at first glance and a viewing of the film maybe required to understand why one movie is considered a drama and the other is not.

## Putting the Model to the Test

Predicting movie genre based off of a poster is not a straightforward task. I wanted to devise a test to compare machine and human labelling performance. I put eight movie posters in front of five friends and family to label a movie’s genre(s). If you want to play at home, you can pause here and assign one to three genre(s) to each movie’s poster.

A picture containing photo, different, bunch, many

Description automatically generated

It is entirely possible that the members of my study have seen the movie or other promotional material and are not solely relying on the posters, while my model only has the movie poster to base its predictions. The movie poster model returns its top four predictions for any movie poster. However, because I told my participants to make three genres guess maximum, my model will only consider its top three predictions.

## Results

After running the eight movie posters through my model the model here are the results:

A picture containing photo, many, different, bunch

Description automatically generated

The eight movies had a combined total of nineteen genres and six unique genres [Drama, Comedy, Romance, Family, Fantasy and Crime]. If you only consider its top three predictions, then it correctly guesses 12/19 movie genres and top four predictions then it correctly guesses 14/19 movie genres. Moreover, I suspect that my model is labeling *Ghosts of Girlfriends Past* a horror movie because the poster used dark and red colours. But how does it rank in the comparison to people manually assign labels?

A screenshot of a cell phone

Description automatically generated

My model is slightly under preforming compared to humans manually labeling the movie’s genre. I did not subtract points if my participants incorrectly guessed genre in my test. The genres that everyone struggled on where *My Girl*’s [Drama, Family] labels, *Ghosts of Girlfriends Past*’s [Fantasy] label and *Intolerable Cruelty*’s [Crime] label. Hence, why this it is a difficult to score 100% on this problem. Additionally, if you predicted romcomdram on every movie then you would receive a 16/19.

## Model Limitations

My model almost always predicts drama as one of its four predictions on any movie poster because it is over trained on drama movie posters. Out of approximately 3000 movie posters it was trained on 70% of those movies had a drama genre label compared to 1% of movie had a science fiction genre label. This is similar to me telling someone that 70% of movies are labelled drama and asked them to take the test. If participants wanted to be conservative, then they would guess drama as one of their labels. I used a Kaggle dataset as the training set for this model. The model had a bunch of random movie frame stills in place of the poster that needed to be filtered out. I have pushed this Kaggle training set to the maximum and to solve this imbalance movie poster issue I would have to make my make my own dataset which is an entire project in of itself.

## Conclusion

I was glad I had another opportunity to meld my two passions of Data Science and Movies once again. Training a Convolutional Neural Network has tested my image modeling abilities while working with large dataset of 40,000 images. I hope to continue on my growth in my Data Science toolbox while providing more edutainment for my readers.

Model code: <https://github.com/MrThomasPin/movie_poster_neural_network/blob/master/src/05_movie_poster_neural_network_full_final.ipynb>

Model poster prediction: <https://github.com/MrThomasPin/movie_poster_neural_network/blob/master/src/07_movie_poster_neural_network_artical_poster_prediction.ipynb>

Github repo: <https://github.com/MrThomasPin/movie_poster_neural_network/tree/master>

Convolutional Neural Network Full ELI5 explanation: <https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53>

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