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

Movie posters are typically the first impressions we have of a film. The poster 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 appear similar. The YouTube channel ‘Cheddar’ explores come of the common clichés 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 a story, themes and genre at a glance, would you be able to teach a deep machine learning model to predict a movies genre based solely off of 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 you to a free Medium article on the subject at the end of this article. The image below is my gross oversimplification of 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 movie poster gets broken down into paint-by-number rendition of itself. 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 different neural pathways. This process is repeated with thousands of move posters until the model becomes confident in its ability to predict the genre of a 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 imagery of romantic-comedy poster where they 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 genres can be a little more nuanced.

For example:

A person with collar shirt

Description automatically generated

Given that these two posters have their lead stars standing back-to-back, the majority of people would correctly guess these movies are rom-coms. However, *No Reservations* is considered a rom-com-dram while *How to Lose A Guy in 10 Days* is only considered a rom-com. The movie posters do not always convey the correct genre of a film at first glance and a viewing of the film may be 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 between one and 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 these movies or other promotional material and therefore their predictions are not solely relying on the posters, while my model only has the movie poster to determine its predictions. The movie poster model automatically returns its top four genre predictions for any movie poster. However, because I told my participants to make three genre 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 comprised of 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 if considering its top four predictions then it correctly guesses 14/19 movie genres. Moreover, I suspect that my model is labeling *Ghosts of Girlfriends Past* as a horror movie because the poster used dark and red colours. But how does it rank in comparison to people manually assigning labels?

A screenshot of a cell phone

Description automatically generated

My model is slightly underperforming compared to humans manually labeling the movie’s genre. No points were deducted for incorrect guesses. The posters genres that everyone struggled on were *My Girl*’s [Drama, Family] labels, *Ghosts of Girlfriends Past*’s [Fantasy] label and *Intolerable Cruelty*’s [Crime] label. Hence, why it is difficult to score 100% on this problem. Additionally, if you predicted rom-com-dram on every movie then you would receive a 16/19.

## Model Limitations

My model almost always chooses 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 movies that 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 safe, then they would always guess drama as one of their labels. I used a Kaggle dataset as the training set for this model. The dataset had a bunch of random movie scene stills in place of the poster that needed to be filtered out. I have pushed this Kaggle training set to its full potential and to try and solve this imbalanced drama genre label, I would have to make my own dataset which is an entire project in and 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 growing 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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