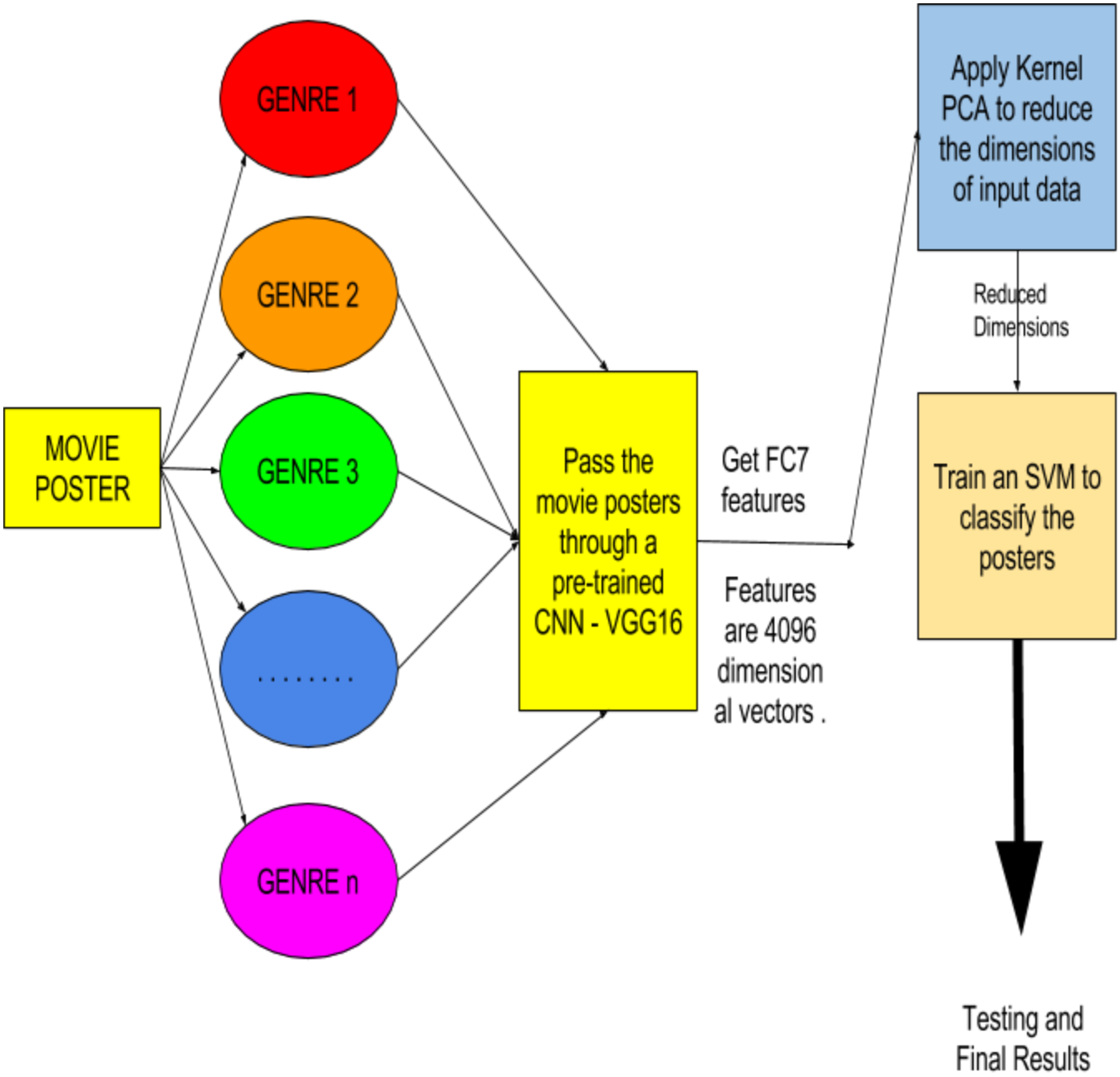
Movie Genre Classification from Movie Posters

Aim - To classify the genre of a movie given the poster of the movie.

Pipeline -



Detailed Approach-

Dataset - The movie posters were scraped from IMDB's website. There are 21 genre's available on the IMDB website - action, adventure, animation, biography, comedy, crime, documentary , drama , family, fantasy, history, horror, music, musical, mystery, romance, sci-fi, short, sport, thriller, war, western.

Preprocessing: The movie posters downloaded from IMDB are of various sizes in the range of (300x400). Before processing the data further each poster was resized to 224x224.

STEPS -

1. The first step involves converting each movie poster to a vector. This is achieved by passing each movie poster image through a pre-trained convolutional neural network. I have used VGG16 which s a convolutional neural network model proposed by K. Simonyan and A. Zisserman from the University of Oxford in the paper "Very Deep Convolutional Networks for Large-Scale Image Recognition" . The model achieves 92.7% top-5 test accuracy in ImageNet , which is a dataset of over 14 million images belonging to 1000 classes.
2. So for each movie poster FC7 features are extracted by passing it through the VGG16 CNN. The features are 4096 dimensional vectors.
3. Currently I am using 5 Genre's. There are 10,000 movie posters for each genre. I have divided the dataset as following -
    a. 70% = 7000 images for training
    b. 30% = 3000 images for testing (for each genre)
    c. Total training images = 7000x(number of genres)
    d. Total testing images = 7000x(number of genres)
4. Then on the FC7 features extracted Kernel PCA has been applied to reduce dimensionality.
    a. Kernel PCA
    b. Compute Gram Matrix using RBF kernel function.
    c. Compute eigen - (values/vectors)
    d. Normalize the eigenvectors: such that eigenvector of matrix is:
    e. Project data
5. Now on the reduced data an SVM is employed to classify the data.
    a. For this scikit-learn python library is used for SVM.

RESULTS-

Number of Genre	Number of Training Images	Number of Testing Images	Hits	Accuracy %
2	200	200	118	59.0
2	1000	1000	621	62.1
3	300	300	170	56.67
3	600	600	368	61.33
4	400	400	218	54.5
4	800	800	503	62.875
5	500	500	234	46.8
5	2000	2000	1185	59.25

Source Code -

Source code can be found at github -
https://github.com/sidgairo18/Movie-Genre-Classification-from-Movie-Poster