Movie Genre Predictions by Movie Posters

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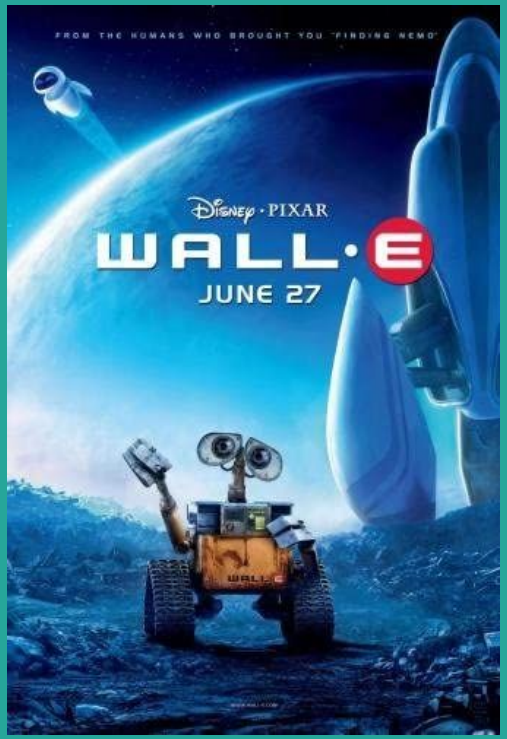
Input: a movie poster

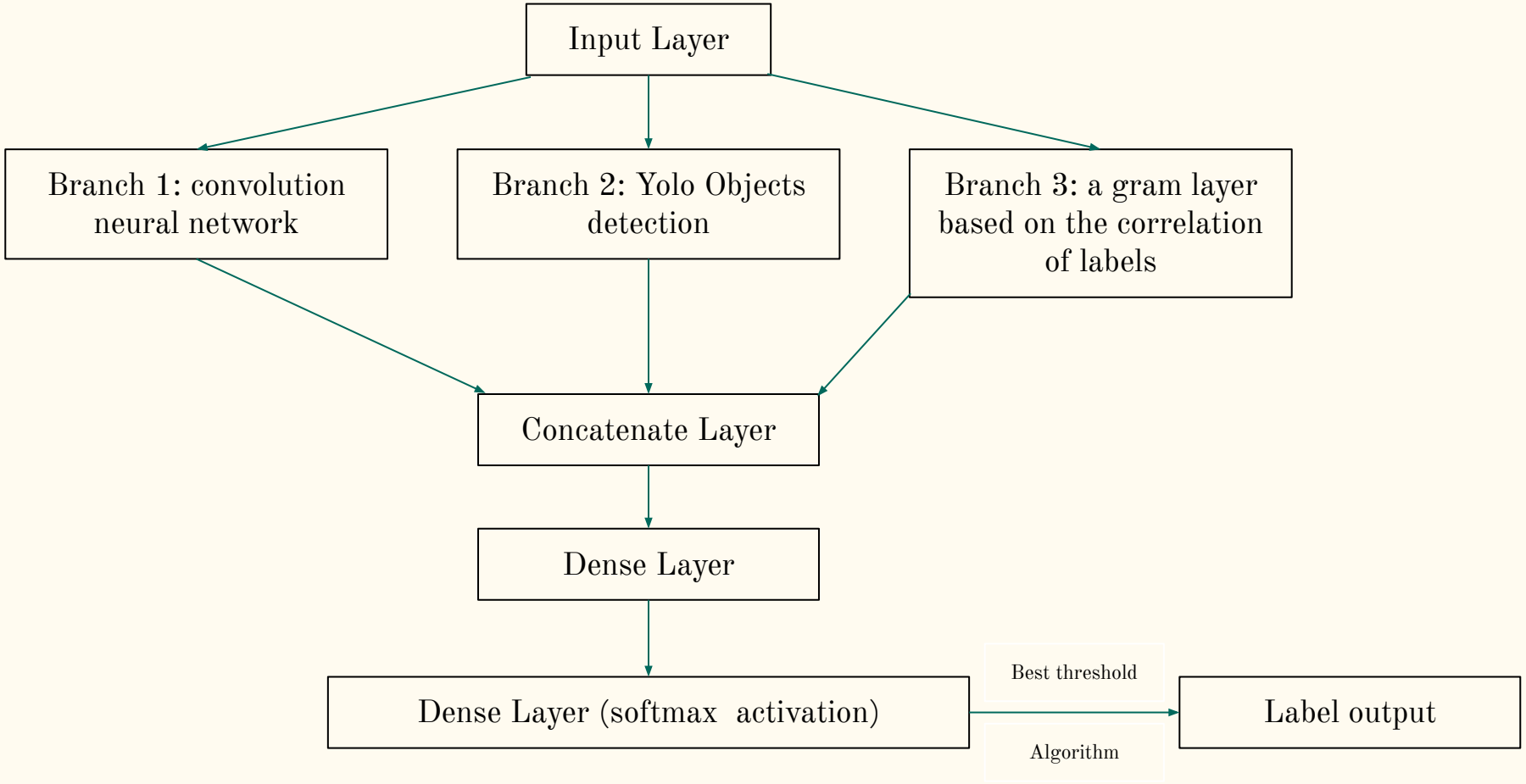


Output: its genres

- Adventure
- Animation
- Family

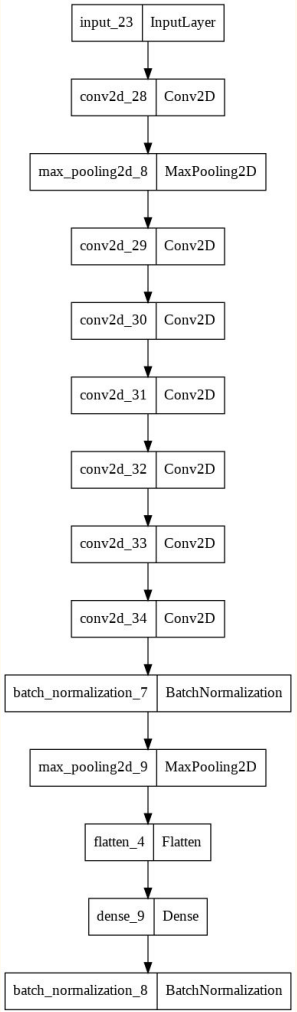
A multi-label classification problem

The Proposed Model


Input Layer
Branch 1: convolution neural network
Branch 2: Yolo Objects detection
Branch 3: a gram layer based on the correlation of labels
Concatenate Layer
Dense Layer
Dense Layer (softmax activation)
Best threshold
Algorithm
Label output

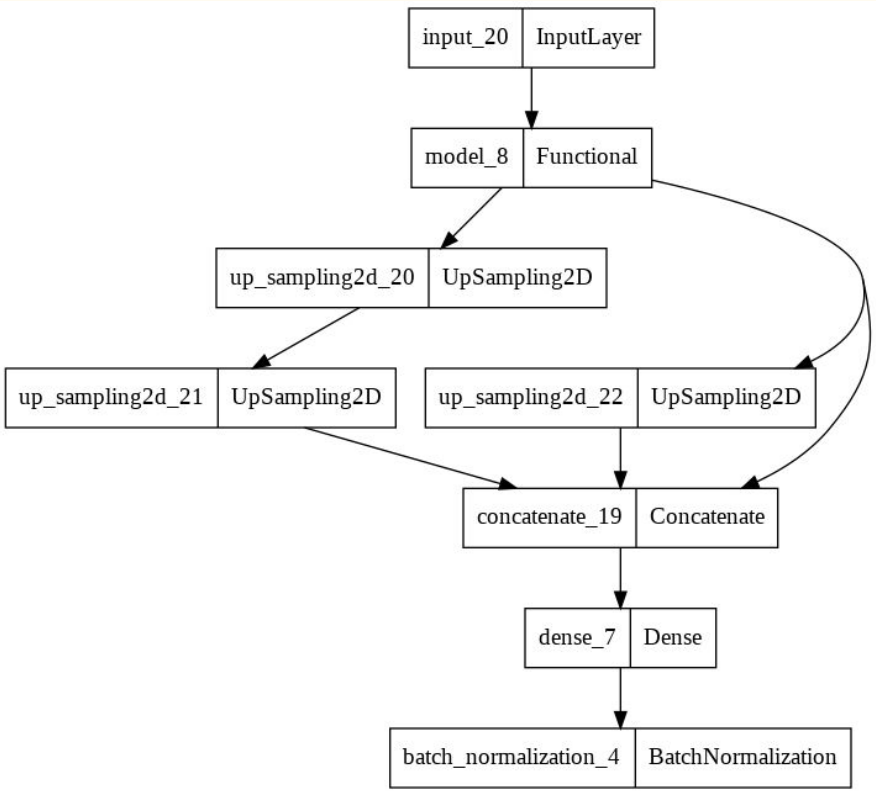
CNN branch

1. Similar to Alex net
2. Some up sampling
3. Then down sampling
4. Followed by a batch normalization layer, max pooling layer, and flatten layer.
5. Finally add a dense layer and a batch normalization layer.



Yolo branch

1. Standard Yolo V3 object detection as base
2. The output are concatenated after some upsampling
3. Then add a dense layer and a batch normalization layer.



Gram Layer branch

Considering add it in future work

Best Threshold Algorithm

Algorithm 1 Algorithm for obtaining the probability thresholds

Input: model output, the predicted probability vector $\hat{\boldsymbol{y}}$, the true probability $\boldsymbol{y}$, obtained from dataset. For example, if movie is of genre 1 and 2, then this true probability vector is $(0.5, 0.5, 0, 0, \dots)$. An predetermined threshold upper bound u and threshold moving stepsize s. All vectors are of length equal to the total number of movie genre, N.
Output: vector of best threshold for current output $\boldsymbol{y}_s$
Initialize $\boldsymbol{y}_s$
for $i = 1$ to N **do**
  $j = 0$
  Initialize empty vector $\boldsymbol{\rho}$ and $\boldsymbol{\theta}$
  for $j < u$ **do**
    Zero initialize a binary vector $\boldsymbol{b}$
    if $\hat{\boldsymbol{y}}_i > j$ **then**
      $b_i = 1$
    else
      $b_i = 0$
    end if
    assign t to be the Matthews correlation coefficient of $\boldsymbol{y}$ and $\boldsymbol{b}$, obtained using [8]
    append $\boldsymbol{\rho}$ the value t
    append $\boldsymbol{\theta}$ the value j
    $j \leftarrow j + s$
  end for
  $k^* = \arg\max_k \boldsymbol{\rho}$
  $(\boldsymbol{y}_s)_i = \boldsymbol{\theta}[k^*]$
end for

About Matthews Correlation

	$y = 1$	$y = 0$	total
$x = 1$	n_{11}	n_{10}	$n_{1\bullet}$
$x = 0$	n_{01}	n_{00}	$n_{0\bullet}$
total	$n_{\bullet 1}$	$n_{\bullet 0}$	n

$$\phi = \frac{n_{11}n_{00} - n_{10}n_{01}}{\sqrt{n_{1\bullet}n_{0\bullet}n_{\bullet 0}n_{\bullet 1}}}$$

Conclusion

Model not trained and no conclusion