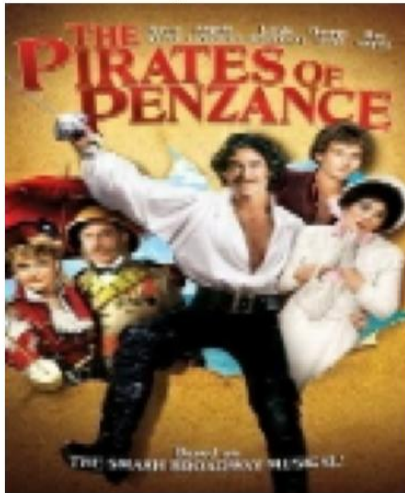


Evaluating CNN and LSTM Models for Genre Prediction

This report evaluates the performance of CNN and LSTM models in a multi-label genre classification task. The CNN model predicts genres based on film posters, while the LSTM model predicts genres using textual overviews. Predictions for three examples are analyzed alongside their ground truth genres. Strengths, weaknesses, and opportunities for improvement are highlighted.

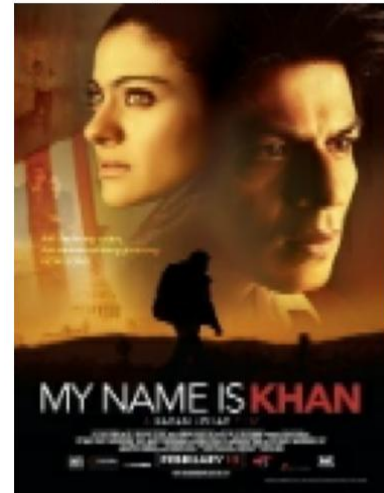
Example 7: Poster



Example 971: Poster



Example 1161: Poster



Example 1(7):

Overview: "After a young man leaves a band of pirates, hilarity ensues."

True Genres: ['Comedy', 'Musical', 'Romance']

Top 3 Predicted Genres (CNN): [Drama: 0.71, Romance: 0.30, Comedy: 0.29]

Top 3 Predicted Genres (LSTM): [Drama: 0.67, Comedy: 0.47, Romance: 0.22]

Analysis: Both models identified "Comedy" and "Romance"; however, CNN performed slightly better by ranking "Romance" higher. Neither model recognized "Musical," likely due to the lack of strong visual or textual cues related to this genre. Both models incorrectly emphasized "Drama," potentially overgeneralizing narrative elements.

Example 2 (971):

Overview: "A veteran cop chases a cold-blooded serial killer, who murders his victims in alphabetical order."

True Genres: ['Mystery', 'Thriller']

Top 3 Predicted Genres (CNN): [Drama: 0.55, Horror: 0.31, Action: 0.29]

Top 3 Predicted Genres (LSTM): [Action: 0.40, Comedy: 0.34, Drama: 0.34]

Analysis: Neither model successfully identified "Mystery" or "Thriller" as top genres, indicating difficulty with these subtler, context-dependent classifications. CNN predictions leaned toward "Drama" and "Horror," influenced by poster imagery. LSTM

predictions, including "Comedy" and "Action," demonstrate confusion from ambiguous textual cues.

Example 3 (1161):

Overview: "An Indian Muslim man with Asperger's syndrome takes a challenge to speak to the President of the United States seriously and embarks on a cross-country journey."

True Genres: ['Adventure', 'Drama', 'Thriller']

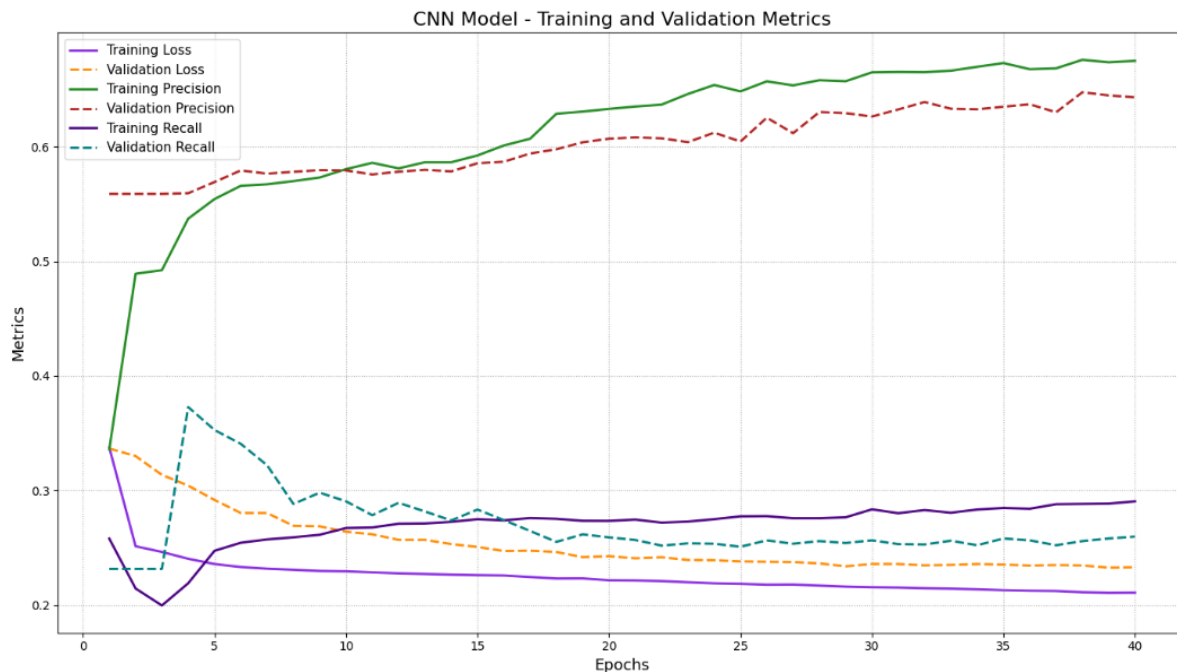
Top 3 Predicted Genres (CNN): [Drama: 0.74, Action: 0.31, Thriller: 0.29]

Top 3 Predicted Genres (LSTM): [Drama: 0.63, Comedy: 0.47, Romance: 0.22]

Analysis: Both models correctly identified "Drama" and CNN captured "Thriller" as a probable genre. However, neither model identified "Adventure." LSTM predictions included irrelevant genres like "Comedy" and "Romance," showing less alignment with the narrative.

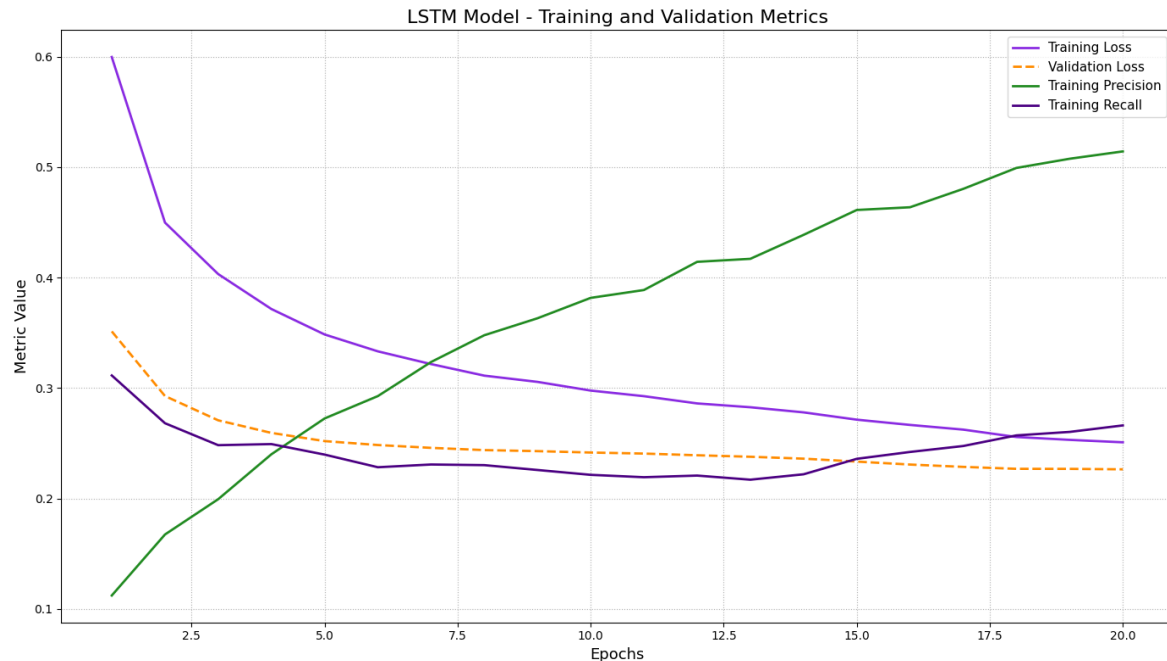
Model Performance Evaluation

CNN Model



- Loss: Training loss steadily decreased to ~0.2113 by epoch 40, while validation loss improved to ~0.2327, showing stable training progress.
- Precision: Training precision improved to ~0.67, and validation precision reached ~0.64, reflecting reasonable generalization.
- Recall: Training recall increased to ~0.29, but validation recall stayed lower (~0.26), indicating limited ability to capture all true genres.

LSTM Model



- Loss: Training loss decreased consistently to ~ 0.2501 by epoch 20, while validation loss plateaued around ~ 0.2265 , suggesting stable performance.
- Precision: Training precision improved to ~ 0.52 , while validation precision stabilized at ~ 0.62 , indicating good generalization for certain genres.
- Recall: Training recall reached ~ 0.26 , while validation recall remained low (~ 0.23), highlighting challenges in capturing all true genres.

Key Observations

Strengths:

- Both models correctly identified at least one genre for all examples.
- CNN was effective in recognizing visually prominent genres like "Drama."
- LSTM showed a contextual understanding of text-based genres, especially when descriptions were explicit.

Weaknesses:

- Both models struggled with subtle genres like "Musical" and "Mystery."
- CNN overgeneralized visual patterns, leading to incorrect emphasis on "Drama."
- LSTM predictions were inconsistent for ambiguous overviews, often including irrelevant genres.

Conclusion

The CNN and LSTM models performed well but exhibited limitations in multi-label classification. While CNN excelled at identifying visually distinctive genres, LSTM showed promise in understanding descriptive overviews.

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Code: https://github.com/sravanth-space/ads2_keras