

CSC 461

# Movie Review Sentiment Analysis

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# Problem Definition

**Sentiment Analysis** for processing and analyzing text in order to extract its emotional tone.

## Models to use:

- Decision Tree
- Naive Bayes
- Logistic Regression
- Neural Networks
- Recurrent Neural Networks



## Data definition



(Dataset downloaded from kaggle)

The dataset consists of 50000 input rows with 2 features:

- The **review** itself (in text format)
- The **sentiment** (positive | negative)

Here's a preview of the dataset →

	review	sentiment
0	One of the other reviewers has mentioned that ...	positive
1	A wonderful little production.   The...	positive
2	I thought this was a wonderful way to spend ti...	positive
3	Basically there's a family where a little boy ...	negative
4	Petter Mattei's "Love in the Time of Money" is...	positive
...	...	...
49995	I thought this movie did a down right good job...	positive
49996	Bad plot, bad dialogue, bad acting, idiotic di...	negative
49997	I am a Catholic taught in parochial elementary...	negative
49998	I'm going to have to disagree with the previou...	negative
49999	No one expects the Star Trek movies to be high...	negative
50000 rows × 2 columns		

## Methods definition

In order to properly use some of the first classifiers, some data preprocessing is required (for RNN other data preparation is required): words → numbers.

**TF-IDF** (*Term Frequency-Inverse Document Frequency*): converts text into numerical data ('bag of words' concept).

It also normalizes the word counts by the frequency of the word in the entire corpus.

*Look how dimensions change →*

```
print(X_train.shape)  
print(X_train_vect.shape)
```

```
(40000,)  
(40000, 92692)
```

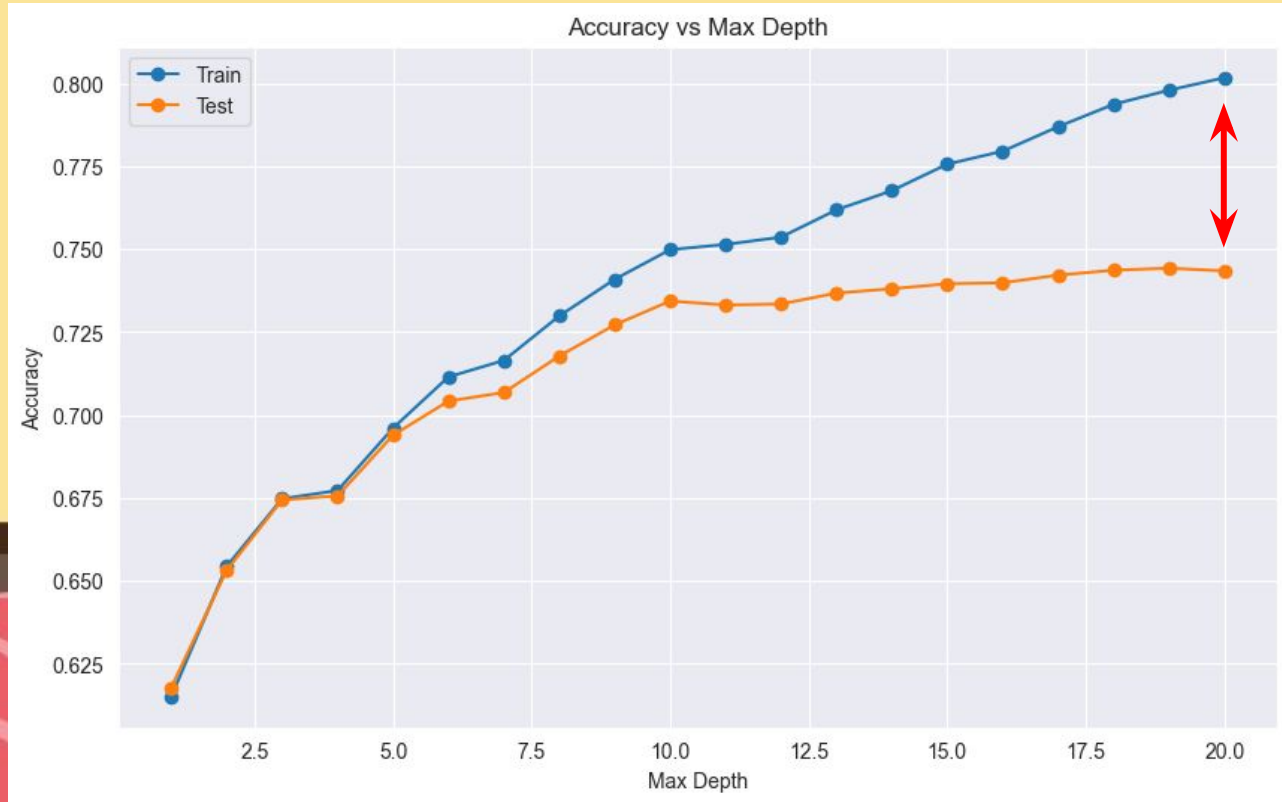
## Decision Tree

Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Decision Tree	1.0	0.7265	1.0	0.726363	Default parameters



Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Decision Tree	0.801775	0.7435	0.813457	0.759449	Best parameters found by GridSearchCV

# Decision Tree



## Naive Bayes

Assumes features are conditionally independent.

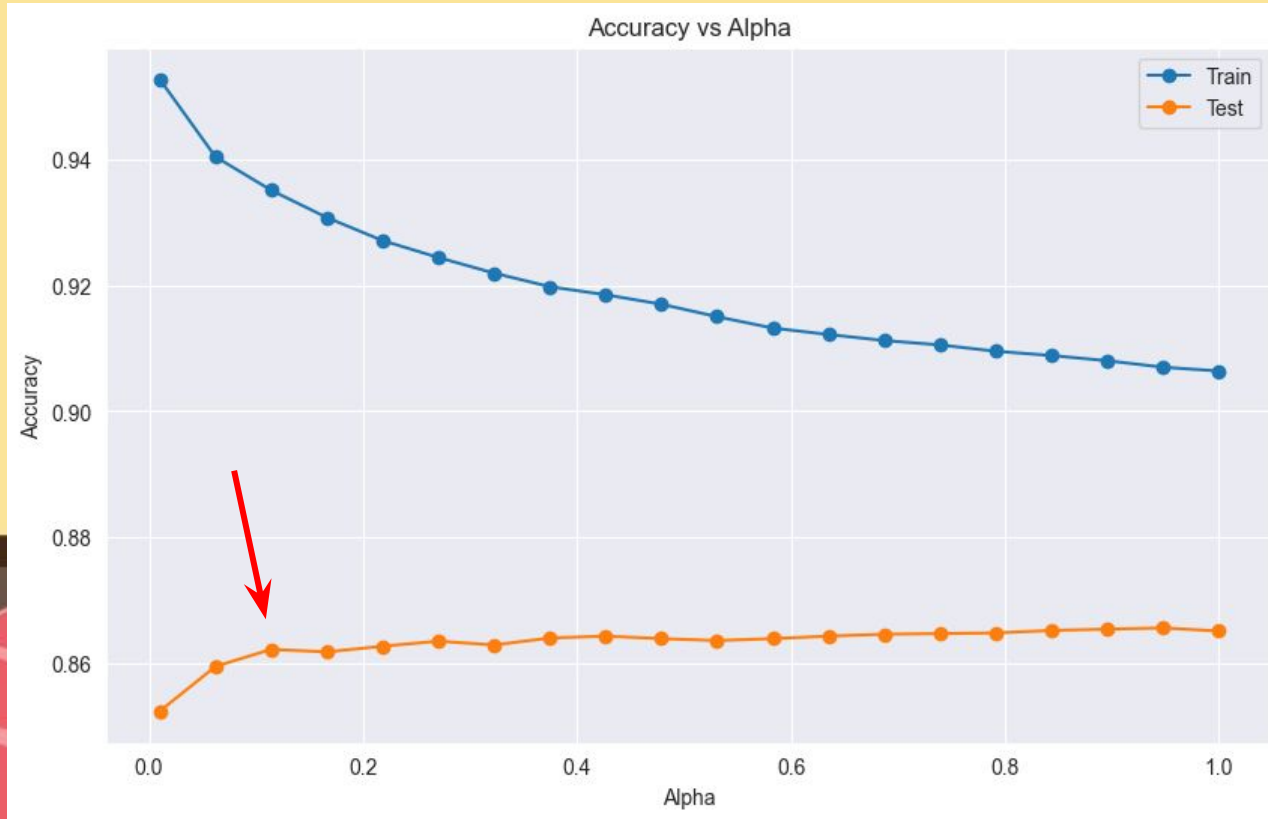
Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Naive Bayes	0.9064	0.8652	0.904975	0.864604	Default parameters



Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Naive Bayes	0.916975	0.864	0.915909	0.863891	Best parameters found by GridSearchCV



# Naive Bayes





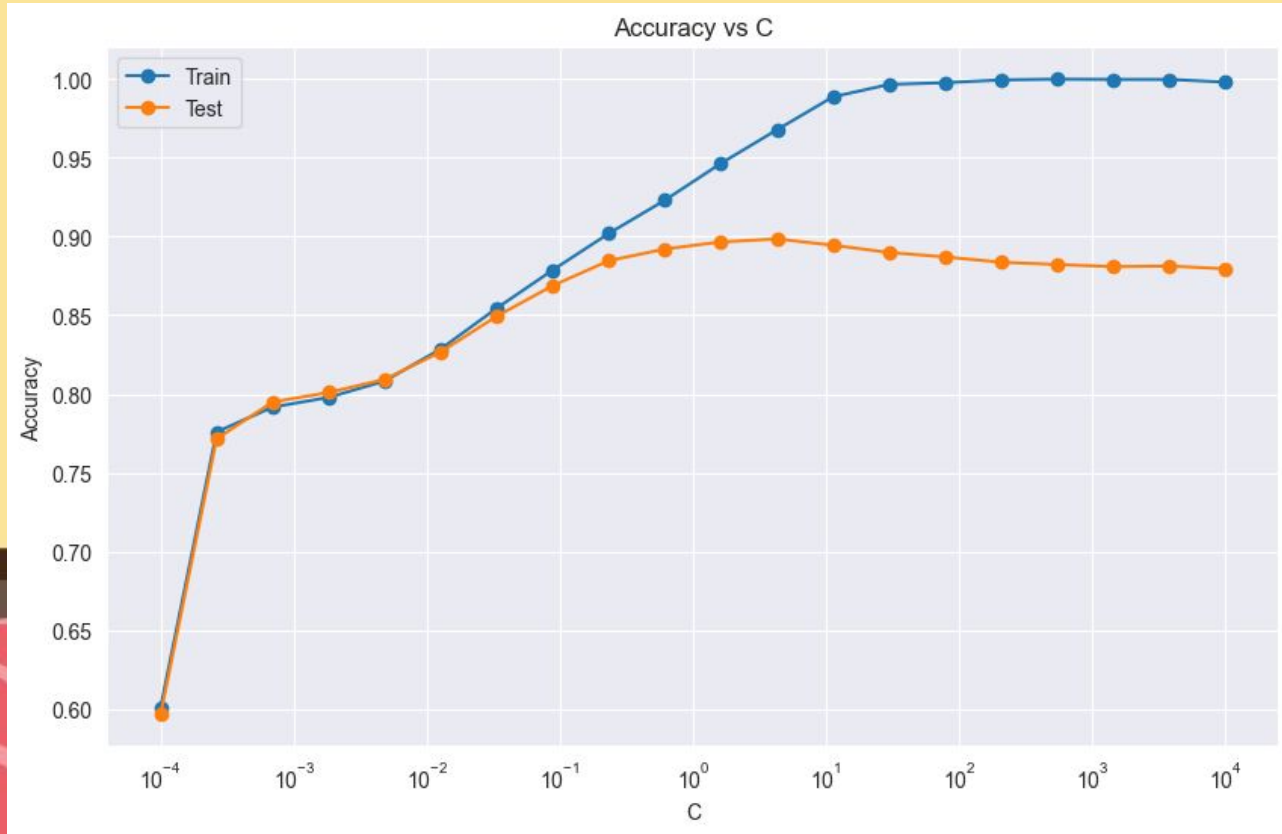
## Logistic Regression

Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Logistic Regression	0.933475	0.8942	0.933867	0.89668	Default parameters

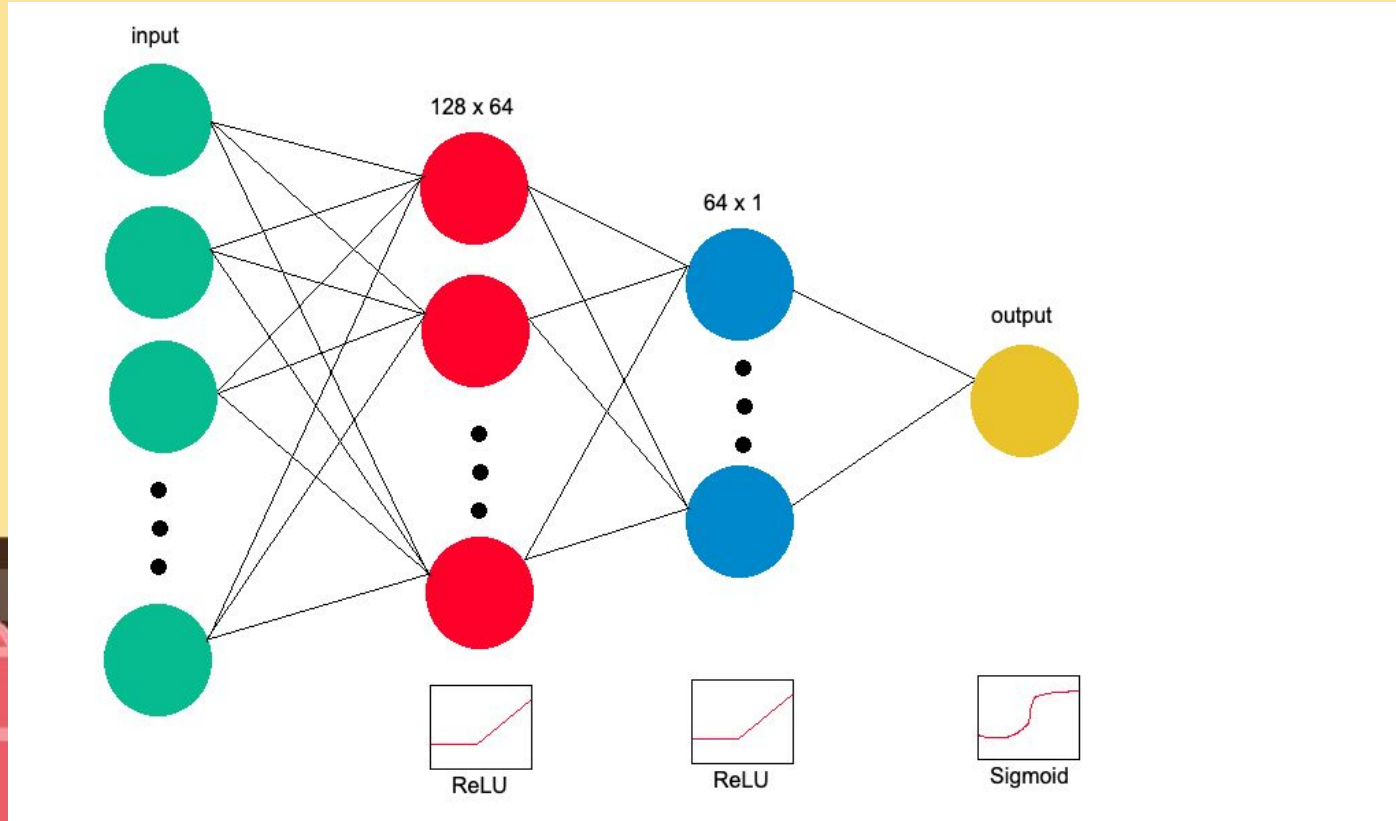


Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
Logistic Regression	0.96765	0.8984	0.967676	0.900353	Best parameters found by GridSearchCV

# Logistic Regression



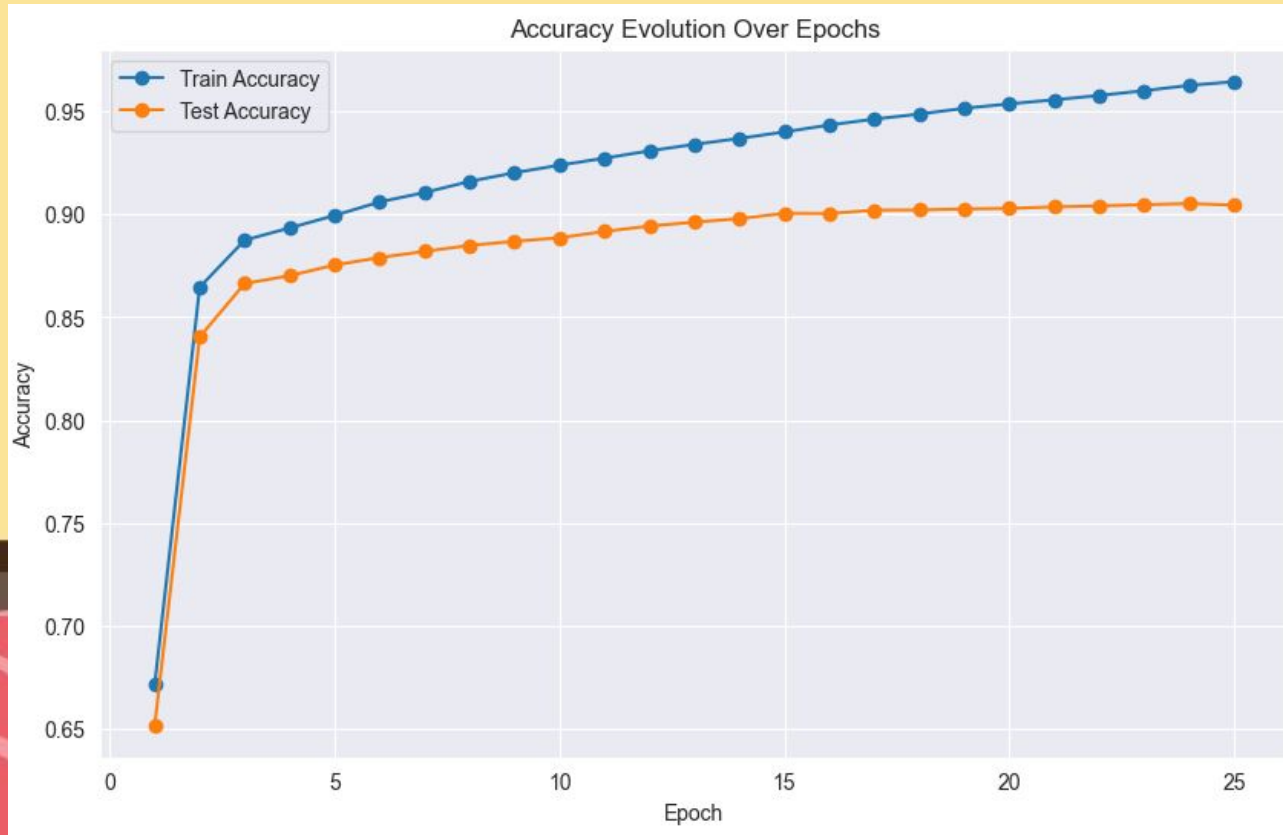
# Neural Networks



# Neural Networks

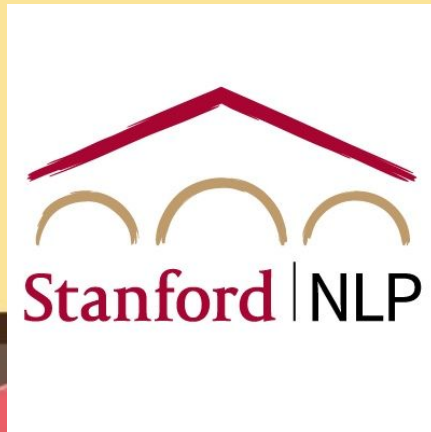
	Method	accuracy_train	accuracy_test	f1_train	f1_test	Comments
0	Neural Network	0.964275	0.9044	0.964246	0.90572	Best parameters found by manual tests

# Neural Networks

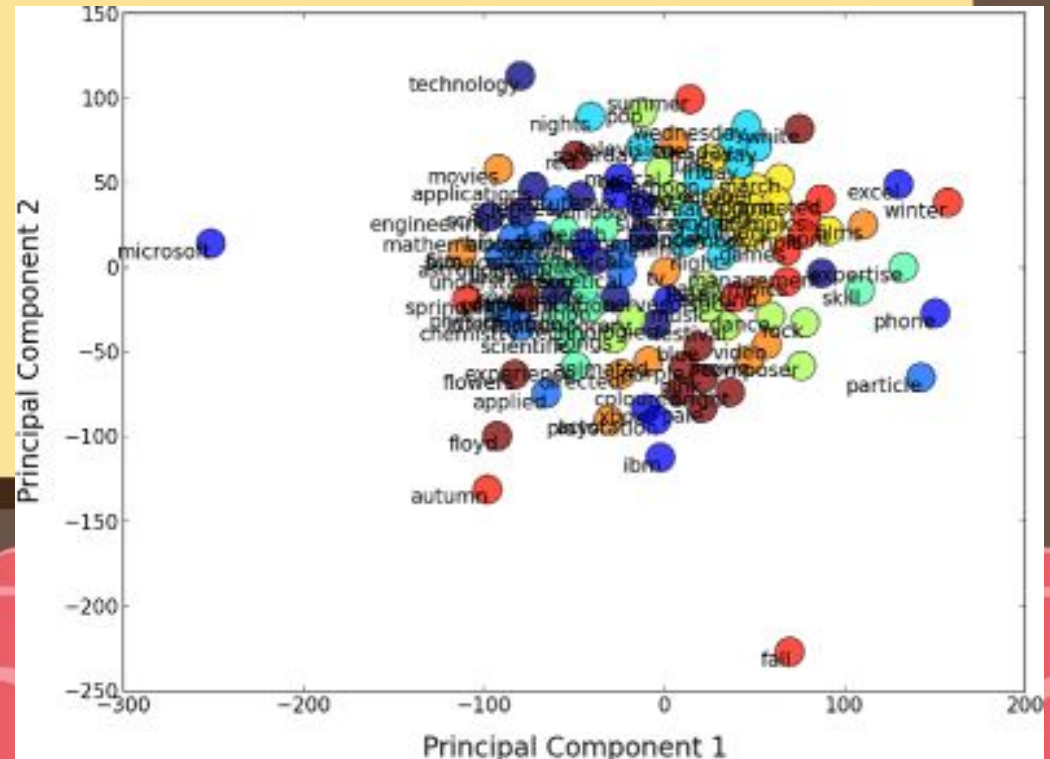


# Recurrent Neural Networks

- *Sequentially-Fed (hidden state)*
- *LSTM approach used*
- GloVe embeddings



## GloVe pre-trained embeddings





# Bidirectional Recurrent Neural Networks (with Attention)



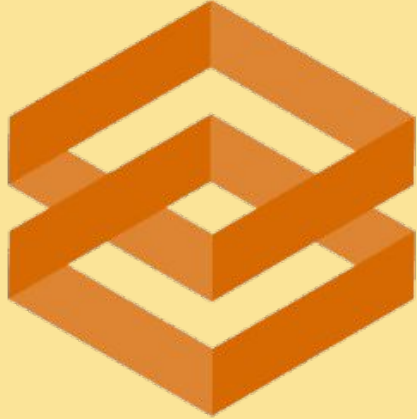
Input sequence processed in both **forward** and **backward** directions.

```
Epoch [6/20] - Train Loss: 0.3014, Val Loss: 0.3119, Train Acc: 0.8878, Val Acc: 0.8656, Test Acc: 0.8630
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:401: UserWarning: To copy construct from a tensor,
  X_batch = torch.tensor(X_batch, dtype=torch.long).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:402: UserWarning: To copy construct from a tensor,
  y_batch = torch.tensor(y_batch, dtype=torch.float32).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:422: UserWarning: To copy construct from a tensor,
  X_batch = torch.tensor(X_batch, dtype=torch.long).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:423: UserWarning: To copy construct from a tensor,
  y_batch = torch.tensor(y_batch, dtype=torch.float32).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:377: UserWarning: To copy construct from a tensor,
  X_batch = torch.tensor(X_batch, dtype=torch.long).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:378: UserWarning: To copy construct from a tensor,
  y_batch = torch.tensor(y_batch, dtype=torch.float32).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:377: UserWarning: To copy construct from a tensor,
  X_batch = torch.tensor(X_batch, dtype=torch.long).to(device)
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:378: UserWarning: To copy construct from a tensor,
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C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:378: UserWarning: To copy construct from a tensor,
  y_batch = torch.tensor(y_batch, dtype=torch.float32).to(device)
Epoch [7/20] - Train Loss: 0.2875, Val Loss: 0.3026, Train Acc: 0.8962, Val Acc: 0.8744, Test Acc: 0.8693
C:\Users\JVS\AppData\Local\Temp\ipykernel_11348\1563266052.py:401: UserWarning: To copy construct from a tensor,
```



**Model Testing**

[Gradio Interface](#)



gradio



## Review 1

I really liked this Summerslam due to the look of the arena, the curtains and just the look overall was interesting to me for some reason. Anyway, this could have been one of the best Sum

## Review 4

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Jane Austen would definitely approve of this one!<br /><br />Gwyneth Paltrow does an awesome job capturing the attitude of Emma. She is funny without being excessively silly, yet elegant. She puts on very period-appropriate British accent (at least British myself, maybe I'm not some

## Review 7

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wome  
/>Highl

For once a story of hope highlighted over the tragic reality our youth face. Favela Rising draws one into a scary, unsafe and unfair world and shows through beautiful color and moving music how one man and his dedicated friends choose not to accept that world and change it through action and art. An entertaining, interesting, emotional, aesthetically beautiful film. I showed this film to numerous high school students as well who all live in neighborhoods with poverty and and gun violence and they were enamored with Anderson, the protagonist. I recommend this film to all ages over 13 (due to subtitles and some images of death) from all backgrounds.

## Review 2

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## Review

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## Review 8

Okay, I didn't get the Purgatory thing the first time I watched this episode. It seemed like something significant was going on that I couldn't put my finger on. This time those Costa Mesa fires on TV really caught my attention- and it helped that I was just writing an essay on Inferno! But let me see what HASN'T been discussed yet...<br /><br />A TWOP review mentioned that Tony had 7 flights of stairs to go down because of the broken elevator. Yeah, 7 is a significant number for lots of reasons, especially religious, but here's one more for ya. On a hunch I consulted wikipedia, and guess what Dante divided into 7 levels? Purgatorio. Excluding ante-Purgatory and Paradise. (The stuff at the bottom of the stairs and... what Tony can't get to.)<br /><br />On to the allegedly "random" monk-slap scene. As soon as the monks appeared, it fit perfectly in place with Tony trying to get out of Purgatory. You can tell he got worried when that Christian commercial (death, disease, and sin) came on, and he's getting more and more desperate because Christian heaven is looking kinda iffy for him. By

## Review 3

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## Review

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## Review 9

I was very disappointed with this series. It had lots of cool graphics and that's about it. The level of detail it went into was minimal, and I always got the feeling the audience was being patronized -- there was a lot of what seemed to me as "This is extremely cool but we're not going to explain it in further detail because you won't get it anyway. Let's just show you some pretty pictures to entertain you." The host would drop interesting-sounding words such as "sparticles" and "super-symmetry" without any attempt at explaining what it was. We had to look it up on Wikipedia.<br /><br />Furthermore, I know quite a bit about superstrings (for a layman) and I found their explanations were convoluted and could have been so much better. They could have chosen MUCH better examples to explain concepts, but instead, the examples they used were confusing and further obscured the subject.<br /><br />Additionally, I got so sick of the repetitiveness. They could easily have condensed the

## Review 10

The first 30 minutes of Tinseltown had my finger teetering on the remote, poised to flick around to watch something else. The premise of two writers, down on their luck, living in a self-storage-space "bin" was mildly amusing, but, painfully bland.<br /><br />The introduction of the character, played by Joe Pantoliano - the big deal movie guy, that lives in the park and sleeps in a lavatory, offered hope and I decided to give it a few more minutes. And then a few more until Kristy Swansons introduction as a budding film director & borderline nymphomaniac, added a bit of spice. Her solid acting performance raised her presence above and beyond just a very welcome eye-candy inclusion.<br /><br />Ultimately, the obvious low-budget impacts on the film with poorly shot scenes, stutted pace and slapstick handling of certain moments. Some of my favourite movies of all time have been low budget, Whithnail & I being one that also deals with 2 guys with a dream, but down on their luck.<br /><br />However, for my money, the actors save Tinseltown from the "Terrible movie" archives and just about nudges it into the "could have been a cult movie" archives. I laughed out loud at some of the scenes involving Joe Pantoliano's character. In particular, the penultimate scenes in the terribly clichéd, but still funny, rich-but-screwed-up characters house, where the story unravels towards it's final moments.<br /><br />I can see how Tinseltown was a great stage play and while the film-makers did their best to translate this to celluloid, it simply didn't work and while I laughed out loud at some of scenes and one liners, I think the first 30 minutes dulled my senses and expectations to such a degree I would have laughed at anything.<br /><br />Unless you're stuck for a novelty coffee coaster, don't pick this up if you see it in a bargain bucket.

Min. % of positive reviews

66

Model Choice

Neural Networks

Clear

Submit

### Overall Recommendation

Not recommendable

### Individual Review Sentiments

	Sentiment
	negative
	negative
	negative
	negative
	negative
	positive
	positive
This is a great movie and one of my all-time favorites.	positive
	positive
	positive

Flag

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Model Choice

Logistic Regression

Clear

Submit

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Not recommendable

Individual Review Sentiments

	Sentiment
	negative
	negative
	negative
	negative
	negative
	negative
	positive
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'his is a great movie and one of my all-time favorites.	positive
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