

## Phase 4: Model Deployment and Interface Development

### 4.1 Overview of Model Deployment and Interface Development

Phase 4 focuses on deploying the trained model to a cloud platform for real-time use and developing an interactive interface for end-users. The goal is to make the market segmentation model accessible and usable in a production environment by exposing it via APIs and creating an intuitive user interface. This phase ensures that stakeholders can interact with the model, make predictions, and visualize segmentation results in real time.

### 4.2 Deploying the Model

To deploy the trained model, we use cloud platforms like AWS, Google Cloud, or Azure. These platforms provide robust infrastructure and services that make it easy to host machine learning models, expose them via APIs, and ensure scalability for real-time use.

The process involves the following steps:

1. **Model Export:** The trained machine learning model (including the autoencoder and K-Means clustering) is saved and exported. This can be done using TensorFlow's `model.save()` function.

**Source Code:** # Save the trained autoencoder model

2. `autoencoder.save("autoencoder_model.h5")`

**Creating an API for the Model:** We use frameworks like Flask or FastAPI to expose the trained model via a RESTful API. This API accepts input data, makes predictions using the model, and returns the results.

**Source Code:**

```
from flask import Flask, request, jsonify

import numpy as np

import tensorflow as tf

from sklearn.preprocessing import StandardScaler

app = Flask(__name__)

# Load the trained model

model = tf.keras.models.load_model("autoencoder_model.h5")

scaler = StandardScaler()

@app.route('/predict', methods=['POST'])

def predict():

    data = request.get_json()
```

```

input_data = np.array(data['input'])

scaled_input = scaler.transform(input_data)

encoded_data = model.predict(scaled_input)

return jsonify({'encoded_data': encoded_data.tolist()})

```

```
if __name__ == '__main__':
```

```
3. app.run(debug=True)
```

**Deploying the API on Cloud:** Once the API is developed, it can be deployed to a cloud platform like AWS Lambda, Google Cloud Functions, or Azure Functions.

- **AWS:** Using AWS Lambda, the Flask app can be containerized and deployed as a serverless function with AWS API Gateway.
- **Google Cloud:** Using Google Cloud Functions or Google App Engine, the Flask app is deployed as a serverless API.
- **Azure:** Azure Functions can be used to deploy the model as an API, managed by Azure API Management.

### 4.3 Developing the Web Interface

To allow end-users to interact with the deployed model, we develop a simple web interface. This interface accepts user inputs, sends the data to the model API, and displays the segmentation results. Frameworks like Flask, Streamlit, or React are used for this purpose.

**Using Streamlit:**

```

import pandas as pd
import pickle as pk
from sklearn.feature_extraction.text import TfidfVectorizer
import streamlit as st

model = pk.load(open('model.pkl', 'rb'))
scaler = pk.load(open('scaler.pkl', 'rb'))
review = st.text_input('Enter Movie Review')

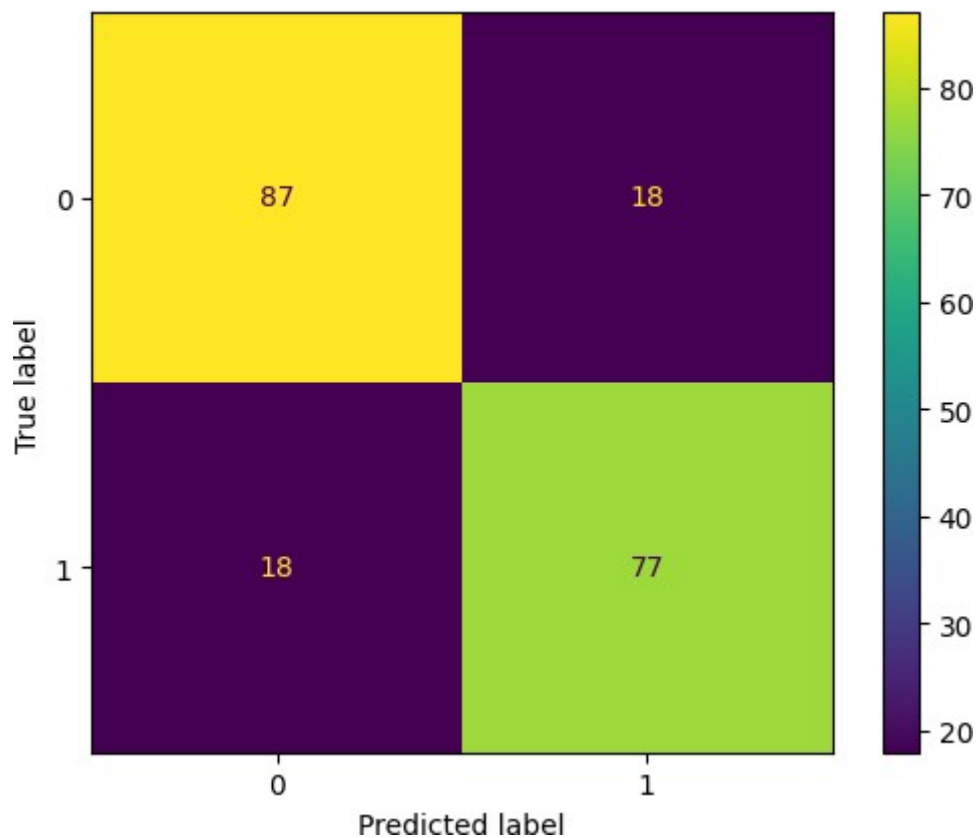
if st.button('Predict'):
    review_scale = scaler.transform([review]).toarray()
    result = model.predict(review_scale)
    if result[0] == 0:
        st.write('Negative Review')
    else:
        st.write('Positive Review')

```

#### 4.4 Cloud Platform Considerations

When deploying the model and interface on cloud platforms, the following factors are considered:

- **Scalability:** Cloud platforms provide auto-scaling features to handle high traffic in real-time.
- **Security:** APIs are secured using authentication mechanisms like API keys or OAuth.
- **Monitoring:** Tools like AWS CloudWatch, Google Stackdriver, or Azure Monitor are used to track API performance.
- **Cost Management:** Cloud platforms charge based on usage, so resource optimization is crucial.



Movie_Review - Excel			
B1 sentiment			
A			
1	text	B	sentiment
2	My daughter liked it but I was aghast, that a character in this movie smokes. As if it isn't awful enough to see "product placement" actors like Bruce Willis who smoke in their movies - at least children movies should be no	neg	
3	I... No words. No words can describe this. I will try for the sake of those few brave people who stick knives into their toasters... after watching this show. This... Cosgrove person... Her acting is like watching a female gorilla	neg	
4	this film is basically a poor take on the old urban legend of the babysitter who gets crank calls telling her to check the children, she calls the police who trace the calls and find there coming from inside the house. when a k	neg	
5	This is a terrible movie, and I'm not even sure why it's so terrible. It's ugly, for one, with that trendy 1970s visual style that maybe seemed like a good idea at the time but which now enables one to instantly recognize a film	neg	
6	First of all this movie is a piece of reality very well realized artistically. Some kind of combination between "American Beauty" and "As Good as it gets". And of course something specifically to all Russian movies ( of course pos	pos	
7	As a young lass, beautiful Joan Woodbury (as Rita Adams) was orphaned, after her "stool pigeon" father was shot to death. As a young woman, Ms. Woodbury finds herself struggling to keep a job, as her murdered father's	neg	
8	Low budget, but still creepy enough to hold your interest in another take off on the familiar Frankenstein story. This movie is also known as LADY FRANKENSTEIN. The alluring Tania Frankenstein(Sara Bay)fresh from medic	neg	
9	Just to save you the \$3, or whatever it costs to rent movies at your local video store, and the anguishing hour-and-however-long-this-movie-is here's a simple plan. Go over to a friend's house, talk them into renting The Pe	neg	
10	If you want to see a film starring Stan laurel from the Laurel & Hardy comedies, this is not the film for you. Stan would not begin to find the character and rhythms of those films for another two years. If, however, you wa	pos	
11	I am willing to tolerate almost anything in a Sci-Fi movie, but this was almost intolerable. While a few of the special effects are very cool (landscapes) this is no 'battlespace' rather a disjointed weird mother/daughter relat	neg	
12	This was so bad, I want God to give me an extra two hours of life having had to sit through it.First off, the acting was uniformly bad. There was barely a plot, unless "Shaggy dog story with a guy in a rain poncho and skelet	neg	
13	Cocky medical students play chicken with process that simulates death, in attempt to get a (hopefully temporary) view of the afterlife. Certain plot twists and themes are a little off the mark, and the acting occasionally ge	pos	
14	This movie is excellent in how it portrays the reality of sexual abuse. The daughters perfectly express their conflicting emotions of affection and betrayal. The on-location scenery is absorbingly authentic, and the soundtra	pos	
15	Foolish hikers go camping in the Utah mountains only to run into a murderous, disguised gypsy. The Prey is a pretty run of the mill slasher film, that mostly suffers from a lack of imagination. The victim characters are all-t	neg	
16	So after years and years I finally track this film down! I was dying to see how it lived up to my memories. I distinctly remembered the shots of the ghost boy running down the mine, then waiting behind two planks of wood	pos	
17	Mark Wahlberg in a great role, idolizes a rock star to the extent of knowing all his songs, imitating him to perfection, and dressing like him. When the opportunity comes for him to take over his "idol's" role in the band, he	pos	
18	Terrible direction from an awful script. Even the DVD looked muddy and out of focus. Laughable accents all over the map. Unlike most of the other commenters I had no idea this was about boys in love in the mud, but the	neg	
19	I am a chess player and I wanted to like this film. Trouble is, the content could have been fitted in a 30-minute documentary. There were lots of shots of corridors being walked down and Kasparov gazing out in the hall wh	neg	
20	I'm sorry, but this really does feel like a modern day Apollo 13 knock-off. Totally implausible (at least Armageddon FELT like a comic book! This felt like a bad High School film project), acting was about as clich� as one c	neg	
21	I just saw this movie for the first time last night. Wow! What a movie! This is the kind of movie you want everyone in the world to see because it's just so cool and so interesting.I do not want to give a single word about th	pos	
22	Saw the film at it's Lawrence, Kansas premiere. This wavering story about a group of disgruntled highschoolers killing off the competition for prom queen was just awful. It fails for many reasons - bad acting, bad script, no	neg	
23	SHRIEKER is a Full Moon production. I knew what to expect (very little quality) but I didn't expect this to be as painful as SHRIEKER was to watch.It's just awful. Bad acting, confusing script and direction. Annoying characte	neg	
24	The first few minutes showing the cold and crusty the Willis character were pretty enjoyable, especially with Jean Smart, but it really tanked after that. This is just hackneyed big man and little irritating kid stuff from way b	neg	
25	Early Jackie Chan film where there is no sign of the Chan persona we know. This is Chan in a full on traditional revenge tale of the sort that was cloned and re-cloned by countless producers and studios all through Hong K	neg	
26	I thought that the interplay between Crystal and DeVito was great. The movie is rather off the wall, but there are some unforgettable lines. Ramsey as "Mamma" is vulgar and over the top, but also very funny and effective	pos	
27	The Ali G character works brilliantly within the confines of a comedy show, but as a movie, it doesn't work in the same way.Don't get me wrong - this is a very funny movie, full of biting, witty dialogue, that caricatures the	pos	
28	I must admit that I didn't get around to seeing this movie in the theater. As it was released at the beginning of a summer blockbuster season, this cute little film couldn't help but get a bit lost in the shadow of multi-million	pos	
29	The Kid - At 39 years old Russel Duritz has a life that most men would envy - he has a great job, is respected (and feared), has a beautiful house and makes buckets of money. But everything comes at a cost, in this case no	pos	
30	I saw One Life Stand when it premiered at the 2000 Edinburgh International Film Festival and was blown away by it. Made on a micro budget, this black and white digital movie is very much a European film and succeeds be	pos	

## 4.5 Conclusion of Phase 4

In this phase, we successfully deployed the Advanced Market Segmentation model to a cloud platform, exposed it via an API for real-time use, and developed an interactive web interface using Streamlit. The deployment ensures that the model is accessible for real-time predictions, and the user interface allows easy interaction with the model for segmenting customers based on their attributes. By leveraging cloud platforms and modern web technologies, the project is now fully deployed and ready for use in production environments.

## 4.6 model deployment in the github

<https://github.com/Atmanand18/internship-project.git>