

**Question:-Final step of the Timelytics [Order to Delivery time prediction] project, and how does the web application assist users in predicting delivery time?**

### CODE

❖ Train\_model python file:

The train\_model.py file is responsible for **training and saving the machine learning model** used to predict delivery time. It prepares data, trains a model, and saves it for later use in the app.py web application.

```
import pandas as pd
import numpy as np
import pickle
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split

# Step 1: Create Sample Dataset
data = {
    "product_category": np.random.randint(0, 4, 100), # Categorical variable
    "customer_location": np.random.randint(10000, 99999, 100), # Zip codes
    "shipping_method": np.random.randint(0, 3, 100), # Shipping type
    "delivery_time": np.random.uniform(1, 10, 100) # Target variable
}

df = pd.DataFrame(data)

# Step 2: Split Features & Labels
X = df[["product_category", "customer_location", "shipping_method"]]
y = df["delivery_time"]

# Step 3: Train-Test Split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Step 4: Train the Model
model = LinearRegression()
model.fit(X_train, y_train)

# Step 5: Save the Trained Model as 'delivery_time_model.pkl'
with open("delivery_time_model.pkl", "wb") as file:
    pickle.dump(model, file)

print("✅ Model trained and saved as 'delivery_time_model.pkl'")
```

#### ❖ app python file:-

The app.py file is a **Streamlit-based web application** that provides a **user-friendly interface** for predicting delivery times using the trained machine learning model. It acts as a bridge between users and the model by taking inputs and displaying predictions interactively.

```
import streamlit as st
import pickle
import numpy as np

# Load the trained model
try:
    with open("delivery_time_model.pkl", "rb") as file:
        model = pickle.load(file)
except FileNotFoundError:
    st.error(" ❌ Model file not found! Please run `train_model.py` first.")
    st.stop()

# Custom CSS Styling
st.markdown(
    """
    <style>
      /* Background */
      .main {
        background-color: #f4f4f4;
      }

      /* Title */
      .title {
        text-align: center;
        font-size: 30px;
        color: #007bff;
        font-weight: bold;
        padding: 10px;
        border-radius: 10px;
        background-color: #ffffff;
        border: 2px solid #007bff;
        width: 60%;
        margin: auto;
      }

      /* Input Fields */
      .stTextInput, .stNumberInput, .stSelectbox {
        border: 2px solid #007bff !important;
        border-radius: 10px !important;
        padding: 8px !important;
        background-color: #fff000 !important;
      }
    </style>
    """
)
```

```

/* Predict Button */
.stButton>button {
    background-color: #007bff !important;
    color: white !important;
    font-size: 18px !important;
    border-radius: 10px !important;
    padding: 10px !important;
    transition: 0.3s;
}
.stButton>button:hover {
    background-color: #0056b3 !important;
}

/* Prediction Output */
.prediction-box {
    text-align: center;
    font-size: 22px;
    font-weight: bold;
    color: #28a745;
    padding: 15px;
    border-radius: 10px;
    background-color: #e9ffe9;
    border: 2px solid #28a745;
    width: 50%;
    margin: auto;
}
</style>
"""
    unsafe_allow_html=True
)

# Streamlit App
st.markdown('<div class="title">🚚 Delivery Time Prediction App</div>', unsafe_allow_html=True)
st.write("📦 **Enter order details below to predict the delivery time.**")


# User Inputs
product_category = st.selectbox("🛒 Select Product Category", [0, 1, 2, 3])
customer_location = st.number_input("📍 Enter Customer Location (ZIP Code)", min_value=10000,
max_value=99999, step=1)
shipping_method = st.selectbox("📦 Select Shipping Method", [0, 1, 2])


# Predict Button
if st.button("🔮 Predict Delivery Time"):
    user_input = np.array([product_category, customer_location, shipping_method])
    prediction = model.predict(user_input)


    st.markdown(f'<div class="prediction-box">📅 Estimated Delivery Time: **{prediction[0]:.2f} days**</div>', unsafe_allow_html=True)

```


## WEB PAGE

 **Delivery Time Prediction**  
**App**


 Enter order details below to predict the delivery time.

 Product category Select Product Category


0


 Enter Customer Location (ZIP Code)


10000


 Select Shipping Method

0


 Predict Delivery Time

 **Delivery Time Prediction**  
**App**


 Enter order details below to predict the delivery time.

 Product category Select Product Category


2


 Enter Customer Location (ZIP Code)

10011

 Select Shipping Method

1

 Predict Delivery Time

 **Estimated Delivery Time:**  
**\*\*4.26 days\*\***