EXPT NO: 8	MINI PROJECT – GLOBAL TRADE AND DYNAMICS ANALYTICS PLATFORM

AIM

To provide comprehensive real-time insights into global trade patterns, commodity flows, and economic indicators through interactive visualizations and data analytics. The platform enables users to explore trade relationships between countries, monitor commodity price trends, and analyze economic performance metrics to support informed decision-making in international trade and investment strategies.

```
import React from "react";
import { Routes, Route, Link } from "react-router-dom";
import { FaHome, FaGlobeAmericas, FaNewspaper, FaGlobe } from "react-icons/fa";
import Home from "./pages/Home";
import Country from "./pages/Country";
import Articles from "./pages/Articles";
import './App.css';


export default function App() {
 return (
  <div className="app-root">
   <header className="topbar">
    <div className="brand"><FaGlobe style={{marginRight: '8px'}} />Global Trade Dynamics</div>
    <nav>
     <Link to="/"><FaHome style={{marginRight: '6px'}} />Home</Link>
     <Link to="/country"><FaGlobeAmericas style={{marginRight: '6px'}} />Country</Link>
     <Link to="/articles"><FaNewspaper style={{marginRight: '6px'}} />Articles</Link>
    </nav>
   </header>


   <main className="main-content">
    <Routes>
    """Dummy  chunk_text  function"""
    ifnot text: return []

    return [text[i:i+chunk_size] for i in range(0, len(text), chunk_size - chunk_overlap)]

@st.cache_data
def remove_mermaid_fences(text: str) -> str:
    """Dummy remove_mermaid_fences function"""
    return text.replace("```mermaid", "").replace("```", "").strip()

@st.cache_data
defget_cosine_scores(chunks: list[str], categories: list[str]) -> list[dict]:
    """Dummyget_cosine_scores function to generate random data"""
    results = []
    local_rng = rng()
    ifnotchunksornot categories:
        return []
    forchunkinchunks:
        res={"text":chunk}
        forcatincategories:
            res[cat]=local_rng.random()
        results.append(res)
    return results

@st.cache_data
def get_top_n_frequencies(content: str, n: int) -> pd.DataFrame:
    """
    Performs basic tokenization, stop word removal, and frequency counting
    on the document content.
```

```
"""
ifnot content:
    return pd.DataFrame({'Term': [], 'Frequency': []})

stop_words = set([
    'i', 'me', 'my', 'myself', 'we', 'our', 'ours', 'ourselves', 'you', 'your', 'yours',
    'yourself', 'yourselves', 'he', 'him', 'his', 'himself', 'she', 'her', 'hers',
    'herself', 'it', 'its', 'itself', 'they', 'them', 'their', 'theirs', 'themselves',
    'what', 'which', 'who', 'whom', 'this', 'that', 'these', 'those', 'am', 'is',
    'are', 'was', 'were', 'be', 'been', 'being', 'have', 'has', 'had', 'having',
    'do', 'does', 'did', 'doing', 'a', 'an', 'the', 'and', 'but', 'if', 'or',
    'because', 'as', 'until', 'while', 'of', 'at', 'by', 'for', 'with', 'about',
    'against', 'between', 'into', 'through', 'during', 'before', 'after', 'above',
    'below', 'to', 'from', 'up', 'down', 'in', 'out', 'on', 'off', 'over',
    'under', 'again', 'further', 'then', 'once', 'here', 'there', 'when',
    'where', 'why', 'how', 'all', 'any', 'both', 'each', 'few', 'more',
    'most', 'other', 'some', 'such', 'no', 'nor', 'not', 'only', 'own',
    'same', 'so', 'than', 'too', 'very', 's', 't', 'can', 'will', 'just', 'don',
    'should', 'now', 'd', 'll', 'm', 'o', 're', 've', 'y', 'ain', 'aren', 'couldn',
    'didn', 'doesn', 'hadn', 'hasn', 'haven', 'isn', 'ma', 'mightn', 'mustn', 'needn',
    'shan', 'shouldn', 'wasn', 'weren', 'won', 'wouldn', 'must', 'may', 'one',
    'would', 'could', 'might', 'time', 'like', 'get'
])

processed_text = content.lower()
processed_text = re.sub(r'[^a-z\s]', ' ', processed_text)

words = processed_text.split()
```

```
    filtered_words = [word for word in words if word not in stop_words and len(word) > 2]

    word_counts = {}
    forword in filtered_words:
        word_counts[word] = word_counts.get(word, 0) + 1

    df=pd.DataFrame(
        list(word_counts.items()),
        columns=['Term', 'Frequency']
    ).sort_values(by='Frequency', ascending=False)

    return df.head(n)

@st.cache_data
defperform_kmeans_clustering(content: str, k: int) -> pd.DataFrame:
    """
    Simulates K-Means clustering on document embeddings.
    Generates deterministic data based on the content hash and k.
    """
    ifnotcontent or k < 1:
        return pd.DataFrame()

    content_hash = hash(content)
    seed_value = abs(content_hash)
    local_rng = rng(seed_value)

    num_points = min(200, 20 + len(content) // 100)

    data=[]
    cluster_centers = local_rng.uniform(-5, 5, size=(k, 2))

    foriin range(num_points):
        cluster_index = local_rng.integers(0, k)
        center = cluster_centers[cluster_index]

        dim1 = center[0] + local_rng.normal(0, 0.5)
        dim2 = center[1] + local_rng.normal(0, 0.5)

        simulated_text = f"Chunk {i+1} (approx. byte {i*100}) - Content focus in Cluster
{cluster_index + 1}"

        data.append({
            'Dimension 1': dim1, 'Dimension 2':
            dim2, 'Cluster': f'Cluster {cluster_index
            + 1}', 'Size': local_rng.uniform(5, 20),
            'Text Snippet': simulated_text

        })

    return pd.DataFrame(data)

@st.cache_data
def get_categories_array(text:str) -> list[str]:
    return [i.strip() for i in text.split(",")]

def wrap_text(text, width=60):
    return "<br>".join(textwrap.wrap(text, width=width))
```

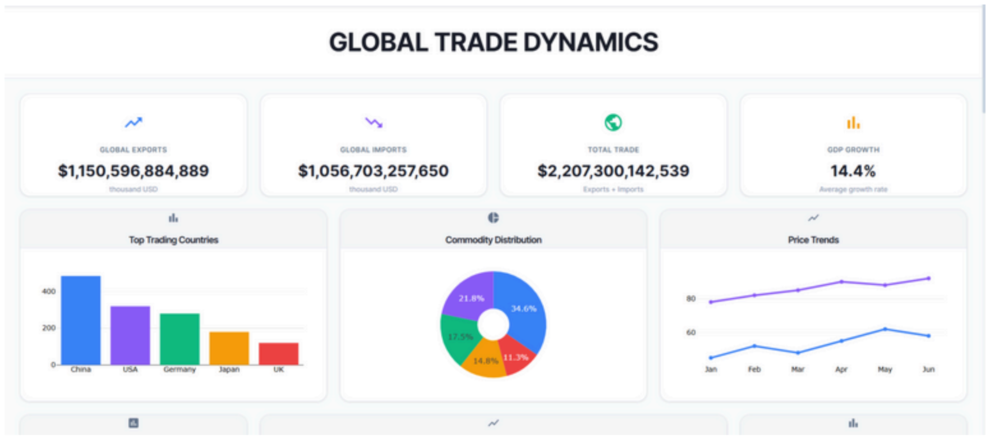
```
def read_txt(file):
    """Reads and returns the content of a .txt file."""
    return file.getvalue().decode("utf-8")


defread_pdf(file):
    """Reads and returns the content of a .pdf file."""
    pdf_reader = PyPDF2.PdfReader(file)
    text= ""
    forpage in pdf_reader.pages:
        ifpage.extract_text():
            text += page.extract_text()
    return text


defread_docx(file):
    """Reads and returns the content of a .docx file."""
    doc= docx.Document(file)
    text= ""
    forpara in doc.paragraphs:
        text += para.text + "\n"
    return text


st.set_page_config(layout="wide")
st.title("📄 Document Analysis")


uploaded_file = st.sidebar.file_uploader(
    "Choose a document (TXT, PDF, or DOCX)",
    type=["txt", "pdf", "docx"]
)
```

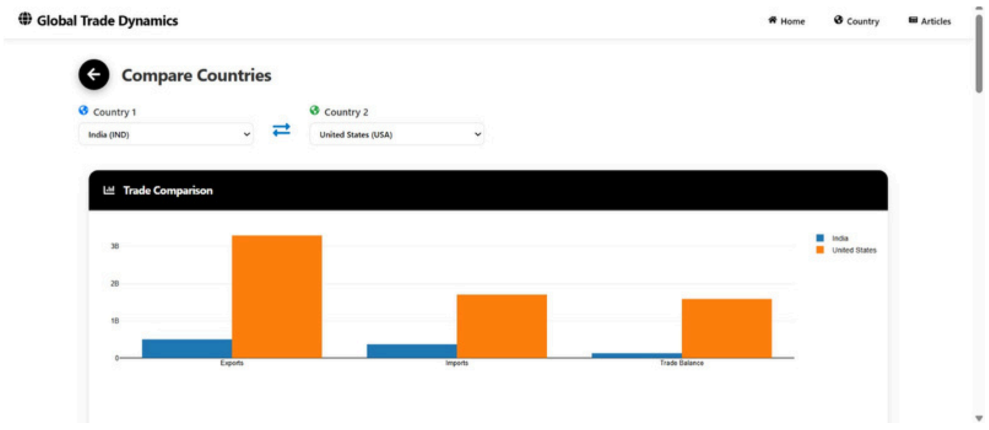
```
content = ""
CHART_HEIGHT = 350
categories = "positive,negative,neutral"
num_clusters = 3
top_n_terms = 5

ifuploaded_file is not None:
    withst.sidebar:
        withst.spinner("Processing document..."):
            file_extension = os.path.splitext(uploaded_file.name)[1]

            iffile_extension == ".txt":
                content = read_txt(uploaded_file)
            eliffile_extension == ".pdf":
                content = read_pdf(uploaded_file)
            eliffile_extension == ".docx":
                content = read_docx(uploaded_file)

    st.sidebar.success("Document loaded successfully!")

    withst.sidebar.expander("Click to view the document's content"):
        st.sidebar.text_area("Content", content, height=200)

    st.sidebar.header("2. Analysis Controls")

    st.sidebar.subheader("Sentiment Specification")
    categories = st.sidebar.text_area(label="Enter categories (comma-separated):",
value="positive,negative,neutral", height=50)

    st.sidebar.subheader("Frequency Specification")
    top_n_terms = st.sidebar.number_input("Top N Terms for Frequency:", min_value=1,
max_value=20, value=5)

    st.sidebar.subheader("Clustering Specification")
    num_clusters = st.sidebar.number_input("Number of Clusters:", min_value=1,
max_value=10, value=3)

else:
    st.sidebar.warning("Please upload a document to get started.")

ifuploaded_fileisnot None:
    col1,col2=st.columns(2)

    with col1:
        withst.container(border=True, height=CHART_HEIGHT + 50):
            st.subheader("📈 Sentiment Trend Analysis")

            withst.spinner("Analyzing sentiment..."):
                categories_list = get_categories_array(categories)
                chunked_content = chunk_text(text=content, chunk_size=1000,
chunk_overlap=100)

                ifnotchunked_content:
                    st.warning("Document appears to be empty or could not be read.")
                else:
                    sentiment_scores_list = get_cosine_scores(chunked_content, categories_list)

                    ifnotsentiment_scores_list:
                        st.warning("Could not generate sentiment scores.")
                    else:
```

```
df=pd.DataFrame(sentiment_scores_list)
df['doc_num'] = range(1, len(df) + 1)
df['text_wrapped'] = df['text'].apply(lambda t: wrap_text(t, width=60))

df_melted = df.melt(
    id_vars=['doc_num', 'text_wrapped'],
    value_vars=categories_list,
    var_name='sentiment',
    value_name='score'
)

fig=px.line(
    df_melted,
    x='doc_num',
    y='score',
    color='sentiment',
    markers=True,
    custom_data=['text_wrapped'],
    height=CHART_HEIGHT - 50
)

fig.update_traces(
    hovertemplate=(
        "<b>Document #%{x}</b><br><br>" +
        "<b>Text</b>: %{customdata[0]}<br>" +
        "<b>Sentiment</b>: %{fullData.name}<br>" +
        "<b>Score</b>: %{y:.2f}"
        "<extra></extra>"
    )
```

```
            )
            fig.update_layout(
                title="Sentiment Score Trends",
                xaxis_title="Document Section",
                yaxis_title="Sentiment Score",
                legend_title="Sentiment"
            )
            st.plotly_chart(fig, use_container_width=True)

    with col2:
        withst.container(border=True, height=CHART_HEIGHT + 50):
            st.subheader("🧠 Mind Map")

            withst.spinner("Generating Mind Map..."):
                mermaid = str(generate_mermaid(content=content))
                mermaid = remove_mermaid_fences(mermaid)
                st.markdown(f"""
                <divstyle=" overflow: auto;">
                    <script type="text/javascript">
                        {st_mermaid(mermaid)}
                    </script>
                </div>
                """,unsafe_allow_html=True)

    with col1:
        withst.container(border=True, height=CHART_HEIGHT + 50):
            st.subheader("📊 Frequency Analysis")
            st.caption(f"Showing the **Top {top_n_terms}** terms found in the document.")
            withst.spinner(f"Calculating top {top_n_terms} terms..."):
              bar_data = get_top_n_frequencies(content, top_n_terms)

              ifbar_data.empty:
                st.warning("Could not generate term frequencies. Document content may be too
shortortoosparse.")
              else:
                bar_fig = px.bar(
                  bar_data,
                  x='Term',
                  y='Frequency',
                  title=f"Top {top_n_terms} Term Frequency",
                  color='Term',
                  height=CHART_HEIGHT - 50
                )
                bar_fig.update_layout(xaxis={'categoryorder':'total descending'})
                st.plotly_chart(bar_fig, use_container_width=True)

        with col2:
          withst.container(border=True, height=CHART_HEIGHT + 50):
            st.subheader("✨ K-Means Document Clustering")
            st.caption(f"Clustering based on simulated embeddings into **{num_clusters}**
groups.")

            withst.spinner(f"Running K-Means with k={num_clusters}..."):
              scatter_data = perform_kmeans_clustering(content, num_clusters)

              ifscatter_data.empty:
                st.warning("Cannot perform clustering on empty content.")
              else:
                scatter_fig = px.scatter(
                    scatter_data, x='Dimension 1', y='Dimension 2',
                    size='Size', color='Cluster', title=f"K-Means
                    Clustering (k={num_clusters})",
                    hover_name='Cluster', custom_data=['Text
                    Snippet'], height=CHART_HEIGHT - 50







                )


                scatter_fig.update_traces(
                    hovertemplate=(
                        "<b>%{hovertext}</b><br><br>" +
                        "<b>Snippet</b>: %{customdata[0]}<br>" +
                        "Dimension 1: %{x:.2f}<br>" +
                        "Dimension 2: %{y:.2f}" +
                        "<extra></extra>"
                    )
                )
                st.plotly_chart(scatter_fig, use_container_width=True)

        else:
            st.info("Upload a document using the sidebar to begin analysis.")
```

OUTPUT:





RESULT:

Thus, the document is analysed successfully using various graphs and an analysis is made.