

# Assignment: GDP Comparison Analysis using Langchain and ChatGPT

In this assignment, you will create a Langchain function call app that retrieves GDP data for two countries, then uses ChatGPT to compare and analyze their economic growth. Follow the steps below to complete the assignment.

## Step 1: Set up the environment

1. Install the required libraries:

```
pip install wbdata langchain openai python-dotenv
```

2. Create a `.env` file in your project directory and add your OpenAI API key:

```
OPENAI_API_KEY=your_api_key_here
```

## Step 2: Load the World Bank data

Create a Python script named `gdp_comparison.py` and add the following code to load the World Bank data:

```
import wbdata
import pandas as pd
from datetime import datetime

def get_country_gdp(country_code, start_year, end_year):
    # Define the indicator for GDP (constant 2015 US$)
    indicators = {'NY.GDP.MKTP.KD': 'GDP'}

    # Fetch the data
    data = wbdata.get_dataframe(indicators, country=country_code,
```

```

data_date=(f"{start_year}:{end_year}")

# Clean and format the data
data = data.reset_index()
data['date'] = pd.to_datetime(data['date']).dt.year
data = data.sort_values('date')

return data

# Example usage:
# gdp_data = get_country_gdp('USA', 2010, 2020)
# print(gdp_data)

```

### Step 3: Create Langchain function calls

Add the following code to create Langchain function calls for retrieving GDP data:

```

from langchain.chat_models import ChatOpenAI
from langchain.schema import HumanMessage, AIMessage, ChatMessage, FunctionMessage
from langchain.prompts import ChatPromptTemplate
from dotenv import load_dotenv
import os

load_dotenv()

chat = ChatOpenAI(temperature=0)

def get_gdp_data(country_code: str, start_year: int, end_year: int) -> str:
    """Get GDP data for a specific country and time range."""
    data = get_country_gdp(country_code, start_year, end_year)
    return data.to_json()

functions = [
    {
        "name": "get_gdp_data",
        "description": "Get GDP data for a specific country and time range",
        "parameters": {
            "type": "object",
            "properties": {
                "country_code": {
                    "type": "string",

```

```

        "description": "The country code (e.g., 'USA' for United States)"
    },
    "start_year": {
        "type": "integer",
        "description": "The start year for the data range"
    },
    "end_year": {
        "type": "integer",
        "description": "The end year for the data range"
    }
},
"required": ["country_code", "start_year", "end_year"]
}
]

def compare_gdp_growth(country1: str, country2: str, start_year: int, end_year: int) -> str:
    """Compare GDP growth between two countries."""

    messages = [
        HumanMessage(content=f"Compare the GDP growth of {country1} and {country2} from {start_year} to {end_year}"),
        AIMessage(content="Certainly! To compare the GDP growth of these two countries, I'll retrieve the data for both."),
        FunctionMessage(name="get_gdp_data", content=get_gdp_data(country1, start_year, end_year)),
        AIMessage(content=f"I've retrieved the GDP data for {country1}. Now, let me get the data for {country2}."),
        FunctionMessage(name="get_gdp_data", content=get_gdp_data(country2, start_year, end_year)),
        AIMessage(content=f"Great, I now have the GDP data for both {country1} and {country2}. I will now compare the growth rates."),
        HumanMessage(content="Please provide a detailed analysis comparing the GDP growth of the two countries.")
    ]

    response = chat(messages)
    return response.content

# Example usage:
# result = compare_gdp_growth('USA', 'CHN', 2010, 2020)
# print(result)

```

## Step 4: Create the main application

Add the following code to create the main application that allows users to input countries and year range for comparison:

```
def main():
    print("Welcome to the GDP Growth Comparison Tool!")

    country1 = input("Enter the first country code (e.g., USA): ").upper()
    country2 = input("Enter the second country code (e.g., CHN): ").upper()
    start_year = int(input("Enter the start year: "))
    end_year = int(input("Enter the end year: "))

    print("\nAnalyzing GDP growth...")
    result = compare_gdp_growth(country1, country2, start_year, end_year)
    print("\nAnalysis Results:")
    print(result)

if __name__ == "__main__":
    main()
```

## Your Task

1. Implement the code provided above in the `gdp_comparison.py` file.
2. Test the application with different pairs of countries and time ranges.
3. Analyze the output provided by the ChatGPT model and ensure it provides meaningful insights into the economic growth comparison.
4. (Optional) Extend the application to include additional economic indicators or visualizations of the GDP data.

## Submission

Submit your completed `gdp_comparison.py` file along with a brief report (maximum 500 words) discussing:

1. The challenges you faced while implementing the application.
2. Your observations on the quality and accuracy of the ChatGPT-generated analysis.
3. Suggestions for improving the application or extending its functionality.