

Swiss National Bank Data Analysis

How do the Total Assets, Foreign Exchange Rates, and International Investment Positions of Switzerland reflect its economic stability and global financial interactions over the years?

Overview

Welcome to the Swiss National Bank Data Analysis Project. This project is designed to analyse financial data obtained from the Swiss National Bank (SNB). It focuses on three key datasets: Total Assets, Foreign Exchange Rates, and Switzerland's International Investment Position. Utilizing a combination of three different database management systems (MongoDB, SQL, and Graph database), we aim to store, process, retrieve, and analyse this data to answer critical research questions about financial trends and patterns.

Dataset Description

Dataset 1 - Total Assets

Online resource: [Total Assets - SNB](#)

Code Download API: [API Endpoint](#)

Description: This dataset provides insights into the total assets held by various banking groups in Switzerland, broken down by consolidation level, domestic or foreign assets, and currency.

Dataset 2 - Foreign exchange rates – Year

Online Resource: [Foreign Exchange Rates - SNB](#)

Code Download API: [API Endpoint](#)

Description: This dataset includes yearly foreign exchange rates, offering a view into the currency valuation trends in relation to the Swiss Franc.

Dataset 3 - “Switzerland’s international investment position – Breakdown by currency – Year”

Online Resource: International Investment Position - SNB

Code Download API: API Endpoint

Description: Details Switzerland's international investment position, categorized by currency, providing insights into the country's global investment strategies and currency preferences.

Project Structure

- **Data Acquisition:** Utilises the `helper_methods.py` script to download datasets using the provided API endpoints. The online resource points to the datasets on SNB website.
- **Database Storage:** The downloaded data are stored across three database systems - MongoDB, SQL, and a Graph database.
- **Data Processing:** Data retrieval, preprocessing, and storage are managed for each database system.
- **Data Analysis:** The processed data are extracted from the databases for comprehensive analysis, including statistical computations and visualization plots.

Getting Started

This section guides you through setting up and running the Swiss National Bank Data Analysis Project. By following these steps, you can download the datasets, set up the databases, and start analysing the data.

Prerequisites

Before you begin, ensure you have the following installed:

- Python (3.8 or later): Download Python
- MongoDB: Install MongoDB
- MySQL: Install MySQL
- A Graph Database of your choice (e.g., Neo4j): Install Neo4j

Installation and Usage

1. **Clone the Repository:** Clone this project to your local machine.
git clone [BobGanti/nci-pai](https://github.com/BobGanti/nci-pai) (github.com)
2. **Install Python Dependencies:** Navigate to the project directory and install the required Python libraries.
`pip install -r requirements.txt.`

Database Setup

3. **MongoDB:** Ensure MongoDB is running on your system. Create a new database for this project.
4. **MySQL:** Set up a MySQL database and create the necessary tables as per the project schema.
5. **Graph Database:** Configure your graph database, setting up any required schemas or nodes.

Data Download and Storage

1. **Download Data:** Use the `download_file` method from `helper_methods.py` to download the datasets.
For each dataset, provide the respective API endpoint.
2. **Store Data:** After downloading, use the provided scripts (`mongo_model.py`, `mysql_model.py`, etc.) to store the data in the respective databases.

Notes

- Ensure that all database connections are correctly configured in the scripts.
- If modifications are needed, such as changing file paths or database credentials, update the respective scripts accordingly.

Requirements

To run this project, you will need:

- Python 3.6 or higher.
- Jupyter Notebook or JupyterLab or VSCode with anaconda extension to open and run `.ipynb`` files.
- The following Python libraries: pandas, numpy, scikit-learn, matplotlib, seaborn. These can be installed via pip commands.
- A basic understanding of Python programming, data analysis, and machine learning concepts.

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Data Analysis

1. Descriptive Statistics: mean, median, mode, range, standard deviation, etc., to give a summary of the data.
2. Data Cleaning and Preprocessing:
 - Handle missing or inconsistent data.
 - Normalization and standardization of the data.
 - Convert categorical data to numerical (one-hot encoding).
3. Exploratory Data Analysis (EDA):
 - Visualizations: Uses histograms, box plots, scatter plots, and heatmaps to understand distributions and relationships in the data.
 - Correlation Analysis: Determines how different variables are related.
 - Trend Analysis: Examines trends over time - annual and monthly trends in hospital admissions.
4. Feature Engineering and Selection:
 - Creates new features (seasonality indicators, population density) critical for predicting hospital admissions.
 - Uses Principal Component Analysis (PCA) for dimensionality reduction.