**Financial Data Visualization and Interactive Gaming Toolkit**

**Team Documentation**

**FHNW, Basel**

**Group Work, Group 4 :**

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**Python Elective, FHNW, Basel**

**Project Location**

GitHub (Full Project – main file to run: “financial\_data\_visualization.py”):

<https://github.com/Deini23/financial-visualization-toolkit.git>

**Rationale for the Topic Chosen**

The financial markets are dynamic and complex, requiring robust tools for analysis and visualization to aid in informed decision-making. Recognizing the importance of data-driven insights in financial trading and investment, our team decided to develop an application that provides comprehensive visualization tools for financial data. Additionally, we wanted to integrate an element of entertainment to offer users a refreshing break from intense analysis, hence the inclusion of the "Happy Humblebee" game. The dual functionality of the application aims to balance productivity and leisure, making it a unique and versatile tool for financial analysts, traders, and enthusiasts.

**Project Goals and User Stories**

**Project Goals**

1. **Financial Data Visualization**: Provide users with interactive and informative visualizations of stock market data to facilitate better analysis and decision-making.
2. **User Engagement**: Incorporate a fun and engaging game to offer users a break from data analysis, thereby enhancing overall user experience.
3. **Educational Value**: Serve as an educational tool for students and professionals to learn about financial data analysis and visualization techniques.
4. **Seamless Integration**: Ensure smooth integration between the financial visualization tools and the game, offering a cohesive user experience.

**User Stories**

1. **As a financial analyst**, I want to visualize stock data over a specified period so that I can identify trends and make informed investment decisions.
2. **As a trader**, I want to compare the trading volume of different stocks to understand market activity and liquidity.
3. **As a student**, I want to learn about different types of financial charts and their interpretations.
4. **As a user**, I want to play a simple and engaging game to relax and take a break from work.

**Project Management**

Our team of five students from FHNW University in Basel collaboratively worked on this project, employing agile methodologies to ensure effective project management and timely delivery. We held regular meetings to discuss progress, brainstorm ideas, and resolve any issues. Each team member was assigned specific roles and responsibilities, leveraging their strengths to contribute to different aspects of the project.

**Project Phases**

1. **Ideation and Planning**: We started with brainstorming sessions to outline the core functionalities and define the project scope. This phase included defining user stories and setting project goals.
2. **Design and Prototyping**: We designed the application layout, user interface, and data flow. Prototyping tools were used to create wireframes and mockups.
3. **Development**: We divided the development tasks among the team members, focusing on both the financial visualization tools and the game. Regular code reviews ensured code quality and consistency.
4. **Testing and Refinement**: Rigorous testing was conducted to identify and fix bugs. User feedback was incorporated to refine the application.
5. **Deployment**: The final application was prepared for deployment, ensuring all dependencies and requirements were met.

**Live Demo of the App Functions**

**Financial Data Visualization**

Our application allows users to visualize financial data for any NASDAQ stock. Key features include:

1. **Data Retrieval**: Users can select a stock symbol and specify a date range to fetch historical data using the yfinance library.
2. **Interactive Charts**: The application generates various charts using matplotlib, including:
   * **Closing Price Chart**: Displays the closing prices of the selected stock over the specified period.
   * **Trade Volume Chart**: Visualizes the trading volume to understand market activity.
   * **Daily Returns Distribution**: Shows the distribution of daily returns to analyze volatility.
   * **Price Correlation Heatmap**: Displays the correlation between different price metrics (Open, High, Low, Close).
   * **Moving Averages**: Plots the 50-day and 200-day moving averages to identify trends.

**User Engagement: Happy Humblebee Game**

To provide a refreshing break, we included the "Happy Humblebee" game, developed using pygame. Key features include:

1. **Engaging Gameplay**: Users control a humblebee navigating through obstacles, with simple yet addictive gameplay mechanics.
2. **High Score Tracking**: The game tracks and displays the user's high score.
3. **Sound Effects**: Enhances user experience with background music and sound effects.

**Implementation Details**

**Financial Data Visualization**

The financial data visualization module is implemented using Python, yfinance, matplotlib, and pandas. The tkinter library is used for the graphical user interface. Users can interact with the application to fetch and visualize stock data, providing a comprehensive analysis toolkit.

**Happy Humblebee Game**

The game is implemented using pygame, providing an engaging experience with smooth animations and sound effects. The game logic includes gravity mechanics, collision detection, and scoring, ensuring an enjoyable gameplay experience.

**Integration**

The integration between the financial visualization tools and the game is seamless, with a user-friendly interface allowing users to switch between functionalities effortlessly.

**Conclusion**

This project exemplifies the effective collaboration of our team from FHNW University in Basel, combining financial analysis tools with interactive gaming. The application not only serves as a powerful tool for financial data visualization but also offers an engaging and enjoyable user experience. Our approach to project management, combined with our technical expertise, has resulted in a high-quality application that meets the needs of diverse users.

We look forward to presenting our project and demonstrating its capabilities in a live demo, showcasing the successful implementation of our ideas and user stories into a cohesive and innovative application.

This documentation provides a comprehensive overview of our project, highlighting the rationale, goals, management approach, and key functionalities.