

Creating a 20-page PowerPoint presentation based on your research paper means providing a comprehensive yet digestible breakdown of the content. Here's how you could structure the slides for a **20-page presentation**:

### Slide 1: Title Slide

- **Title:** Development of a Simulator to Determine Personal Financial Strategies Using Machine Learning
- **Subtitle:** A tool for improving personal finance management through simulations and machine learning
- **Presenter's Name**
- **Institution / Organization**
- **Date**

### Slide 2: Overview of the Presentation

- **Introduction to Personal Finance Management**
- **Simulator Design and Features**
- **Machine Learning Integration**
- **Technologies Used**
- **Simulator Architecture**
- **Future Work and Research Directions**
- **Conclusion and Impact**

### Slide 3: Introduction to Personal Finance Management

- **Importance of Financial Literacy:** Personal finance is critical for managing resources effectively.
- **Challenges:** Many individuals face difficulties such as low financial literacy, liquidity management, and long-term planning.
- **Goal:** Improve financial competence through interactive learning and real-time financial simulation.

### Slide 4: The Need for a Personal Finance Simulator

- **Current Challenges:**
  - Lack of financial education in schools.
  - Difficulty in making informed financial decisions without real-world experience.
  - The gap between financial theory and practical application.
- **Solution:** The simulator enables users to experiment with different financial strategies and observe long-term

consequences.

### Slide 5: Key Objectives of the Simulator

- **Educational Tool:** To teach personal finance principles, including budgeting, saving, investing, and managing debt.
- **Simulation of Real-Life Scenarios:** Allow users to make financial decisions and track their impact over time.
- **Machine Learning Integration:** Provide personalized financial strategies based on the user's financial behavior and decisions.

### Slide 6: Key Features of the Simulator

- **Home Page:**
  - Collect user data (e.g., salary, expenses, country).
  - Enable assessment mode for progress tracking.
- **Simulation Page:**
  - Real-time tracking of expenses, savings, and investments.
  - Options to simulate weeks or months of financial activity.
- **Results Page:**
  - Provides feedback and comparisons with national/global averages.

### Slide 7: The Random Event System

- **What is a Random Event?**
  - Introduces unpredictable life events (e.g., illness, birth, unexpected expenses) into the simulation.
  - Occurs once every 10 weeks to keep the simulation realistic but not disruptive.
- **Purpose:** To simulate real-world financial unpredictability and help users plan for unexpected events.

### Slide 8: Machine Learning and Financial Strategy

- **What is Q-Learning?**
  - A reinforcement learning algorithm where an agent learns the value of actions by interacting with an environment.
  - In the context of the simulator, Q-learning is used to optimize financial strategies over time.
- **How It Works:**
  - The simulator's agent takes actions based on user decisions, evaluates the outcomes, and adjusts strategies

for future decisions.

- The agent's decisions are based on learned financial behavior patterns.

### **Slide 9: Machine Learning Application in the Simulator**

- **Optimization of Financial Strategies:**

- System learns from each financial decision (e.g., saving, investing, taking loans).
- Gradual improvement of the agent's ability to recommend actions based on the user's financial history.

- **Real-Time Decision-Making:**

- Suggestions are offered on how to manage accounts (e.g., savings, investments) based on the user's financial profile.

### **Slide 10: Technologies and Tools Used**

- **Backend:**

- **C# and ASP .NET Core:** Chosen for performance, cross-platform compatibility, and reliable dependency management.
- **SQLite:** A lightweight, fast database solution for managing user data.

- **Frontend:**

- **React:** Provides a dynamic, fast user interface.
- **Redux:** State management library to handle complex data flows within the application.

- **Machine Learning:**

- **SharpRL:** A library used to implement Q-learning for financial strategy optimization.

### **Slide 11: Software Architecture**

- **Client-Server Architecture:**

- **Frontend:** React SPA (Single Page Application) for fast interactions.
- **Backend:** ASP .NET Core server handling API requests and data processing.
- **Database:** SQLite for storing user data, transaction history, and financial events.

- **Machine Learning Integration:**

- SharpRL library to power the Q-learning-based financial

strategy system.

- **External Services:**

- Integration with APIs to retrieve current exchange rates and financial data.

## **Slide 12: Simulator Interaction Flow**

- **User Input:**

- Enter personal data: salary, expenses, country, and currency.
- Option to enable assessment mode for tracking financial progress.

- **Simulation:**

- Navigate through weeks/months of simulation.
- Make decisions regarding savings, investments, loans, etc.
- Experience the effects of decisions through dynamic account updates.

- **Results:**

- At the end of the simulation, view a summary of financial outcomes.
- Compare personal results with average financial behaviors in the user's country and globally.

## **Slide 13: User Interface Structure**

- **Welcome Page:**

- Data input form for users to set up their profile.

- **Simulation Page:**

- Display current financial status, account balances, and options for simulating time periods.
- Control panel for managing funds, opening new accounts, and reviewing progress.

- **Results Page:**

- Summary of financial performance, with comparisons to national/global benchmarks.

## **Slide 14: Configuration and Customization**

- **JSON-Based Configuration:**

- Settings such as countries, currencies, financial events, and deposit options are stored in JSON files.
- Easily customizable, allowing for future changes without

code modification.

- **Flexible Simulator Settings:**

- Users can adjust various parameters like currency exchange rates, loan interest rates, and event frequencies.

### **Slide 15: Deployment on Microsoft Azure**

- **Cloud Hosting:**

- The simulator is hosted on **Microsoft Azure**, which provides scalability, reliability, and security.

- **Deployment Process:**

- Uses Azure for backend hosting, allowing real-time interaction and efficient data processing.

- **Access Control:**

- Simple authentication and user data management ensure privacy and security.

### **Slide 16: Adjusting the Simulator Settings**

- **Configurable Parameters:**

- Modify simulation settings via JSON files.
- Example: Countries.json, Currencies.json, Event.json.

- **Purpose:** This ensures the simulator is adaptable to different scenarios, whether changing financial policies or adjusting for specific educational purposes.

### **Slide 17: Future Work and Research Directions**

- **Policy-Based Reinforcement Learning:**

- Incorporate advanced reinforcement learning algorithms to enhance the adaptability of the system.
- Improve system's ability to respond to unpredictable financial situations.

- **Web-Based Platform:**

- Extend the simulator to a fully web-based application for broader accessibility.
- Include mobile versions for a more interactive user experience.

### **Slide 18: Conclusion**

- **Summary of Contributions:**

- A web-based personal finance simulator designed to help

- users improve their financial decision-making.
- Uses machine learning to provide personalized financial strategies based on user behavior.
- **Impact:**
  - Helps users, particularly students, learn essential financial skills in a practical, engaging way.
  - Offers real-time decision-making tools to prepare individuals for real-world financial challenges.

### **Slide 19: Acknowledgments**

- **Contributions:**
  - Acknowledge any collaborators, mentors, or funding sources that contributed to the research.
  - Cite any relevant studies or tools used (e.g., SharpRL, ASP .NET Core, etc.).

### **Slide 20: Questions and Discussion**

- Open the floor for questions.
- Provide contact information or additional resources for those interested in learning more.

This structure ensures you cover all the key aspects of the simulator and its underlying technology while also providing detailed explanations and examples. If you're looking for specific content on each slide, I can help break down the text further for each page.

**More and more questions and problems related to finances are becoming relevant for everyone. Therefore, it is very important not only to be aware of the latest economic and market**

developments but also to be competent in the ability to manage personal finances.

**Personal finances are the own capital of an individual or family, which he manages inde-**

pendently. Personal finance management includes the ability to manage them, which requires separate training [1].

**Personal finance management and planning has a wide**

**range of approaches discussed in**

scientific and applied sources worldwide. Traditionally the problem is studied within the prism

**of efficient and safe personal fund liquidity management.**

**Kaplan and Violante [2] discuss**

**so-called “hand-to-mouth” consumption as the challenge to solve with improving personal**

finance competence while designing fiscal stimulus payments. The evidence of the importance

**of conscious management of personal finance was the found and highlighted with extensive**

data analysis in the study of Olafsson and Pagel [3].

**Behavioral finance approaches are getting popular in analyzing and consulting personal**

financial habits and management. The comprehensive study on the publications in the field of

behavioral economics and behavioral finance highlights high interest and publication activity

in the field, while concluding that despite behavioral finance has the higher publication activity

and a broader network of authors, it concentrates on the definition of theoretical problems and

pays less attention to finding solutions [4].

**Application of the ICT to study, visualize and develop personal finance management is a**

reasonable and inevitable movement revealing itself in the modern digitalized and computerized

**world. The use of business simulations in higher education establishments highlights the**

**effectiveness and efficiency of this active learning method to support traditional educational**

**methods [5]. More sophisticated approaches of the use of artificial intelligence to employ**

behavioral finance apparatus in investment banking, back-end, and client-facing operations are

being studied now. Königstorfer and Thalmann [6] conducted a structured literature review of

the examples of the productive application of AI and behavioral finance to bank operations as

well as the challenges to it.

The problem of development immersive, realistic, and ML-enabled educational simulation in the area of private finance competency development is not sufficiently developed and described.

This work aims to contribute to this field of theoretical study and practical application.

The purpose of this work is to develop the mechanics of a personal finance simulator and build

**a system for determining effective personal financial strategies using machine learning. The methods of web programming, object-oriented programming, machine learning, analysis of**

scientific and scientific-practical publications, experimental analysis were used in the work.

The development of a personal finance management simulator will allow in the future to use

it to teach the elements of such financial management, even at school age [1].