Journal of Research Administration
Society of Research Administrators International

A RECOMMENDER SYSTEM FOR FINANCIAL MOBILE APPS BASED ON SENTIMENT ANALYSIS OF CROWD SOURCED FEEDBACK

Saptaparna Ghosh
Assistant Professor, Institute of Engineering and Management, Kolkata and University of Engineering and Management, Kolkata, Email: saptaparna.ghosh@iem.edu.in

Dr Mitali Sengupta
Associate Professor, Institute of Engineering and Management, Kolkata and University of Engineering and Management, Kolkata.

Dr Satyajit Chakrabarti
Professor, Institute of Engineering and Management, Kolkata and University of Engineering and Management, Kolkata.

Abstract: This article presents a recommender system for financial mobile apps based on the sentiment analysis of crowd sourced feedback along with country wise comparison. The article explains the benefits and challenges of using crowdsourcing platforms and web search tools to collect and analyze user feedback and ratings of financial mobile apps from different sources, languages, and markets. The article also provides some design and evaluation guidelines for such a system, as well as some ethical and legal considerations. The article aims to help users find the best app for their needs and preferences, as well as to help developers and providers of financial mobile apps to understand and improve their products and services.
Keywords: recommender system, financial mobile apps, sentiment analysis, crowdsourcing, web search, country wise comparison.

Introduction:

Financial mobile apps are applications that allow users to access various financial services, such as banking, payments, investing, budgeting, and more, through their smartphones or other mobile devices. These apps have become increasingly popular in recent years, as they offer convenience, security, and personalization to their users. However, with the proliferation of financial mobile apps in the market, users may face difficulties in choosing the best app for their needs and preferences. Moreover, users may have different opinions and experiences with the same app, depending on their expectations, goals, and contexts.

Therefore, a recommender system for financial mobile apps can be a useful tool to help users find the most suitable app for them, based on their feedback and ratings, as well as the feedback and ratings of other similar users. A recommender system is a software that analyzes user data and behavior to provide personalized suggestions for products or services. In the context of financial mobile apps, a recommender system can use various algorithms to analyze the sentiment of user feedback, which is the expression of positive or negative emotions and opinions, and compare the

feedback across different countries, regions, or markets, to provide tailored recommendations for financial mobile apps.

Literature Survey:

A recommender system for financial mobile apps is a software that analyzes user data and behavior to provide personalized suggestions for financial mobile apps. Financial mobile apps are applications that allow users to access various financial services, such as banking, payments, investing, budgeting, and more, through their smartphones or other mobile devices. A recommender system for financial mobile apps can help users find the most suitable app for their needs and preferences, as well as help developers and providers of financial mobile apps to understand and improve their products and services.

There are various types and techniques of recommender systems, such as collaborative filtering, content-based filtering, hybrid filtering, knowledge-based filtering, and context-aware filtering. Each type and technique have its own advantages and disadvantages, depending on the characteristics of the data, the domain, and the user. For example, collaborative filtering can provide serendipitous recommendations based on the preferences of similar users, but it may suffer from the cold-start problem, which occurs when there is not enough data for new users or items. Content-based filtering can provide recommendations based on the attributes of the items, but it may suffer from the overspecialization problem, which occurs when the recommendations are too similar to the user's previous choices. Hybrid filtering can combine the strengths of different types and techniques, but it may increase the complexity and cost of the system. Knowledge-based filtering can provide recommendations based on the user's explicit or implicit needs and goals, but it may require a large and accurate knowledge base. Context-aware filtering can provide recommendations based on the user's current situation and environment, but it may require a reliable and efficient way of capturing and processing the contextual information.

There are various applications and domains of recommender systems, such as web, books, e-learning, tourism, movies, music, e-commerce, news, specialized research resources, television programs, etc. Each application and domain have its own challenges and opportunities, depending on the nature and scope of the data, the user, and the item. For example, web recommender systems can help users navigate and explore the vast and dynamic information on the internet, but they may face the challenges of scalability, diversity, and privacy. Book recommender systems can help users discover and enjoy books that match their interests and tastes, but they may face the challenges of sparsity, novelty, and serendipity. E-learning recommender systems can help users learn and improve their skills and knowledge, but they may face the challenges of personalization, adaptivity, and feedback. Tourism recommender systems can help users plan and enjoy their trips and vacations, but they may face the challenges of context, preference, and satisfaction. Movie recommender systems can help users find and watch movies that suit their moods and preferences, but they may face the challenges of popularity, rating, and genre. Music recommender systems can help users listen and discover music that fits their styles and tastes, but they may face the challenges of mood, emotion, and preference. E-commerce recommender systems can help users buy and sell

products and services that meet their needs and expectations, but they may face the challenges of trust, quality, and loyalty. News recommender systems can help users read and follow news that is relevant and interesting to them, but they may face the challenges of timeliness, freshness, and diversity. Specialized research resources recommender systems can help users find and access research papers, articles, books, etc. that are related and useful to their research topics, but they may face the challenges of quality, citation, and plagiarism. Television program recommender systems can help users watch and enjoy television programs that match their preferences and schedules, but they may face the challenges of schedule, genre, and channel.

Among the various applications and domains of recommender systems, financial mobile apps are a relatively new and emerging area that has attracted the attention of researchers and practitioners. Financial mobile apps can provide users with convenience, security, and personalization in accessing various financial services, such as banking, payments, investing, budgeting, and more, through their smartphones or other mobile devices. However, with the proliferation of financial mobile apps in the market, users may face difficulties in choosing the best app for their needs and preferences. Moreover, users may have different opinions and experiences with the same app, depending on their expectations, goals, and contexts. Therefore, a recommender system for financial mobile apps can be a useful tool to help users find the most suitable app for them, based on their feedback and ratings, as well as the feedback and ratings of other similar users.

There are several studies that have proposed and developed recommender systems for financial mobile apps, using various types and techniques of recommender systems, such as collaborative filtering, content-based filtering, hybrid filtering, knowledge-based filtering, and context-aware filtering. For example, Sharaf et al. presented a survey on recommendation systems for financial services, reviewing the types, techniques, and applications of recommender systems in different finance sectors, such as banking, insurance, stock market, etc. Roy and Dutta conducted a systematic review on recommender systems, focusing on diverse applications like books, movies, products, etc., and providing a taxonomy and a research perspective on recommender systems. Advances in mobile financial services: a review of the literature reviewed the literature on mobile financial services, analyzing the global perspectives, applications, and systems of mobile financial services, and identifying the research gaps and opportunities.

However, there are still some challenges and limitations that need to be addressed and overcome in developing and implementing a recommender system for financial mobile apps, such as:

- The quality and quantity of the data, which may affect the accuracy and reliability of the recommendations. For example, the data may be sparse, noisy, inconsistent, outdated, or incomplete, which may reduce the performance and effectiveness of the recommender system.
- The privacy and security of the user data, which may affect the trust and confidence of the users. For example, the data may be exposed, leaked, hacked, or misused, which may harm the user's personal and financial information and interests.
- The diversity and complexity of the user preferences, which may affect the satisfaction and loyalty of the users. For example, the user preferences may change over time, vary across

contexts, or conflict with each other, which may make it difficult for the recommender system to provide relevant and personalized recommendations.

- The evaluation and validation of the recommender system, which may affect the quality and improvement of the recommender system. For example, the evaluation and validation methods may be subjective, biased, or inadequate, which may limit the feedback and learning of the recommender system.

Therefore, there is a need for further research and development in the field of recommender systems for financial mobile apps, to address and overcome these challenges and limitations, and to provide more effective, efficient, and reliable recommender systems for financial mobile apps. Some possible directions and topics for future research and development are:

- The use of advanced and novel data mining and machine learning techniques, such as deep learning, neural networks, natural language processing, etc., to enhance the data analysis and processing capabilities of the recommender system, and to improve the accuracy and reliability of the recommendations.
- The use of innovative and interactive user interface and user experience design, such as gamification, visualization, personalization, etc., to enhance the user engagement and involvement with the recommender system, and to improve the satisfaction and loyalty of the users.
- The use of rigorous and comprehensive evaluation and validation methods, such as online experiments, user studies, metrics, etc., to measure and compare the performance and effectiveness of the recommender system, and to provide feedback and learning for the recommender system.

Sentiment Analysis of Crowd Sourced Feedback:

Sentiment analysis is the process of using an algorithm to categorize content based on how positive, neutral, or negative it is perceived to be. For example, a sentiment analysis algorithm can assign a sentiment score to a user review of a financial mobile app, based on the number and intensity of positive and negative words used. Sentiment analysis can be performed manually, by human annotators, or automatically, by machine learning models. However, manual sentiment analysis can be time-consuming, expensive, and prone to bias, while automated sentiment analysis can be inaccurate, especially when dealing with linguistic nuances, such as sarcasm, irony, or slang. Therefore, a hybrid approach that combines both manual and automated methods can be more effective and efficient.

One way to perform sentiment analysis of crowd sourced feedback is to use crowdsourcing platforms, such as Amazon Mechanical Turk, CrowdFlower, or Microworkers, to collect and label user feedback from various sources, such as app stores, social media, blogs, or forums. Crowdsourcing platforms allow researchers or developers to post tasks, such as sentiment analysis, and pay workers, who are usually anonymous and distributed around the world, to complete them. Crowdsourcing sentiment analysis can have several benefits, such as:

- It can reduce the cost and time of sentiment analysis, compared to hiring professional annotators or developing complex machine learning models.
- It can increase the accuracy and reliability of sentiment analysis, by aggregating the opinions of multiple workers, who can provide different perspectives and insights.
- It can enhance the diversity and representativeness of sentiment analysis, by capturing the feedback of users from different countries, cultures, and backgrounds.

However, crowdsourcing sentiment analysis can also have some challenges, such as:

- It can introduce noise and inconsistency in the data, due to the varying quality and expertise of the workers, who may have different levels of understanding, motivation, and honesty.
- It can raise ethical and legal issues, such as the privacy and security of the user data, the fairness and transparency of the payment and rating systems, and the accountability and responsibility of the task providers and workers.

Therefore, crowdsourcing sentiment analysis requires careful design and management, such as:

- Defining clear and specific instructions and guidelines for the workers, such as the definition and examples of sentiment, the format and length of the feedback, and the criteria and scale for the sentiment score.
- Providing adequate training and testing for the workers, such as the use of pre-labeled data, quizzes, or tutorials, to ensure their competence and consistency.
- Implementing quality control and assurance mechanisms, such as the use of multiple workers, gold standard data, or expert reviews, to verify and validate the results.
- Analyzing and aggregating the data, such as the use of statistical methods, machine learning models, or visualization tools, to synthesize and interpret the findings.

Country Wise Comparison of Financial Mobile Apps:

Another aspect of a recommender system for financial mobile apps is to compare the feedback and ratings of the apps across different countries, regions, or markets, to identify the similarities and differences in user preferences, expectations, and experiences. This can help users to discover new or alternative apps that may suit their needs and preferences better, as well as to learn from the best practices and innovations of other countries or regions. Moreover, this can help developers and providers of financial mobile apps to understand the needs and preferences of their current and potential users, as well as to adapt and improve their products and services to different markets and cultures.

One way to compare financial mobile apps across countries is to use web search tools, such as Google, Bing, or Yahoo, to collect and analyze data from various sources, such as app stores, websites, blogs, or forums, that provide information, reviews, or ratings of financial mobile apps in different countries or regions. Web search tools can have several benefits, such as:

- They can provide access to a large and diverse amount of data, from different sources, languages, and formats, that can reflect the popularity, reputation, and performance of financial mobile apps in different markets and cultures.

- They can offer various features and functions, such as keywords, filters, or advanced operators, that can help users to refine and customize their search queries, to find the most relevant and reliable data for their needs and preferences.
- They can display the data in a user-friendly and interactive way, such as lists, tables, charts, or maps, that can help users to compare and contrast the data, to identify the trends, patterns, and insights.

However, web search tools can also have some limitations, such as:

- They can produce incomplete or inaccurate data, due to the availability, quality, and validity of the sources, the currency, timeliness, and freshness of the data, and the bias, subjectivity, and manipulation of the information.
- They can generate overwhelming or irrelevant data, due to the abundance, diversity, and complexity of the data, the ambiguity, generality, and specificity of the search queries, and the ranking, sorting, and filtering of the results.
- They can pose ethical and legal challenges, such as the privacy and security of the user data, the ownership and attribution of the data, and the compliance and regulation of the data.

Therefore, web search tools require careful selection and evaluation, such as:

- Choosing the most appropriate and trustworthy sources, such as official, reputable, or authoritative websites, blogs, or forums, that provide relevant, reliable, and valid information, reviews, or ratings of financial mobile apps in different countries or regions.
- Applying the most effective and efficient search strategies, such as using specific, descriptive, or advanced keywords, filters, or operators, that can help users to narrow down and optimize their search queries, to find the most pertinent and useful data for their needs and preferences.
- Assessing the most relevant and reliable results, such as using criteria, indicators, or metrics, such as the number, quality, and diversity of the sources, the date, frequency, and recency of the data, and the sentiment, rating, and ranking of the information, reviews, or ratings, to compare and contrast the data, to identify the trends, patterns, and insights.

Conclusion:

A recommender system for financial mobile apps based on the sentiment analysis of crowd sourced feedback along with country wise comparison can be a valuable tool to help users find the best app for their needs and preferences, as well as to help developers and providers of financial mobile apps to understand and improve their products and services. However, such a system requires careful design and implementation, as well as constant monitoring and evaluation, to ensure its effectiveness, efficiency, and reliability. Moreover, such a system should respect the privacy, security, and rights of the users, as well as the ethical and legal standards of the data.

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