Project and Professionalism

Milestone 2

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Literature Review

1. Time Banking

According to Ms. Disha Harit and Prof. Veena Dwivedi, time banking is a form of community currency utilized to exchange services based on time hours rather than monetary payment, irrespective of the service provided. The journal mentions that time banks implement reciprocity, meaning, if an individual provides services in exchange for time credits, they can use the same time credits to exchange for a skill or service they need. The time bank system redefines work, giving value in contributions that might be overlooked in a traditional setting. For example, a hard labor like caregiving is often ignored and underpaid in today's capitalist system, giving priority and importance to only specialized jobs. Time banking takes the underpaid and worthless deemed jobs into consideration and gives recognition to that labor by deeming it equal as any other specialized jobs. Delving into the history of time banking, the concept of time banking has been around for more than we expected. The first timebanks dated back to the Industrial Revolution. An American revolutionary, Josiah Warren opened a Time Store in Cincinnati on 1827, where merchandise was exchanged based on how long it took to make them. Delving further, the article mentions Japan as the country where time banking first originated. The world's first timebank was started in Japan by Teruko Mizushima in 1973. Similarly, many time banks were established throughout the history across the globe including major countries like UK, Spain, China and so on. Additionally, the paper details about the implementation of time banking in India. The first timebank in India was established on 2019 by Madhya Pradesh government Happiness Department with more than 50,000 volunteers. Another implementation of time banking in India was the Time Bank of India Trust, a Jaipur based NGO that works for the elderly citizens of the country. The authors emphasize how innovative concepts time banks help tackle the challenges and untapped potential of the already existing volunteerism and helping culture of India. Time banking will assist in creating reciprocity among the communities and will be equally beneficial to all the sections of the society. They also underscore how time banking could possibly strengthen community ties and local support networks for socially marginalized groups (Ms. Disha Harit, 2021).

2. Geolocation

The paper explores the historical development of geolocation in the browser, it's use cases and the challenges and current and future efforts in the area. The article first delves into the era before smartphones, where developers had to get location by implicitly mapping IP addresses of browsers. Then came the introduction of Google Gears geolocation API, a browser plugin that revolutionized how the browser could access location data and get precise latitude and longitude. It had two JavaScript methods: getCurrentPosition(), which made a single attempt to get user location, and watchPosition() which updated whenever a user changed positions. Shortly after Google Gears, Mozilla Geocode appeared as an experimental add-on for Firefox 3 to explore geolocation. Geode provided an early version of the W3C Geolocation API and included a geolocation service provider called Skyhook. Then, the developers of Google Gears aimed to make Google Gears obsolete by pushing for a standardized web API that would make location access a core feature of the browsers themselves. According to Mr. Thomas Steiner and his team, the W3C Geolocation API defined a high-level interface for accessing device location data, including latitude and longitude. The transition to standardized web API was a game changer allowing developers to write code once and allow it to run on different browsers seamlessly. The API allowed both one-shot position requests and repeated updates, along with the ability to query cached positions. It included getCurrentPosition() to get the current location, watchPosition() to monitor the location, and clearWatch() to stop monitoring. After which, the W3C Geofencing API was introduced, it sets up invisible boundaries in a map that can trigger certain actions when a device enters or exits an area. But the article notes it as still being on the experimental phase due to the reliability concerns of service workers. For continuous tracking, the Wake Lock API was developed to always have location access even when a device shuts down. Then, the Geolocation Sensor API was created to extend the Sensor interface, providing a modern API for obtaining device geolocation. The journal specifically highlights an application "Where Am I" that tracks location continuously. The authors also provide a code snippet to show how to keep the geolocation service running in the background. Delving further into the journal, the document underscores the need to balance functionality with user privacy. It mentions the four main measures to ensure user privacy: blocking user geolocation access in insecure websites altogether, feature policy integration, privacy prompts, and limiting sensor readings to active, visible documents from the same origin. Finally, the journal delves into the future works and improvements in this particular sector (Thomas Steiner, 2019).

3. Geospatial Queries

This research paper aims to make a comparative analysis on the performance of B-tree, hashed and geospatial indexing techniques in NoSQL databases for real-world geospatial use cases. The authors evaluate these techniques based on query execution time, storage overload and scalability. The article aims to provide practical guidance for developers for selecting the optimal indexing technique according to their needs. The analysis utilized a structured approach for comparing indexing techniques. This includes dataset selection, algorithm definition, experimental setup, performance analysis, and result visualization. The research used a “Countries GeoJSON” dataset from reputable geospatial databases and national mapping agencies. The dataset had essential attributes like country names, ISO codes, and geometries, and was preprocessed to ensure consistent geometries and a standardized coordinate system. Then, a robust connection to MongoDB cluster was established and spatial data was integrated into MongoDB. After which, index creation was done for optimized query performance using B-Tree, Geospatial, or Hashed indexes, executing simple, medium, and complex geospatial queries, visualizing results with Matplotlib, and measuring performance based on query execution time, CPU usage, and index size. Finally, the researchers of this paper conduct two case studies to analyze the performance of the three indexing techniques. On the first case study, the authors used a dataset of 1000 restaurant locations and conducted range and nearest neighbor searches. The results showed that geospatial indexes were best for nearest neighbor searches and distance-based queries, hashed indexes for point-in-polygon and range queries, and B-Tree indexes for general spatial queries but face challenges with high-dimensional data and complex operations. Similarly, a second case study was conducted in the context of educational data management, utilizing a comprehensive dataset related to students. They again conducted range and nearest neighbor searches. The case study found that Geospatial indexing excelled in nearest neighbor searches (2.6506ms) and handled diverse geometries well but had the highest CPU usage (3.25%) and memory consumption (91.45%). B-Tree indexing performed best for range queries (2.7644ms), was versatile, and had the lowest CPU usage (<2%), while Hashed indexing was efficient for point-based lookups but struggled with complex queries. Index creation times were fastest for B-Tree (4.577ms) compared to Hashed (5.773ms) and Geospatial (5.880ms). In conclusion, geospatial indexing was ideal for spatial queries, B-Tree for scalability and range queries, and hashed for simple lookups (Abhishek Kaushik, 2024).

4. Achievement Badges for Intrinsic Motivation

Mr. Georg Volkmar and his team believe intrinsic motivation to be very crucial in generating engagement and enjoyment in video games. This research paper investigates the impact of adaptive video game achievements on player motivation. According to this article, achievement badges are digital trophies that can be unlocked by displaying a specific set of skills of the player and helps increase player motivation and engagement. But the paper aims to achieve adaptive achievement by recognizing that players are different and by catering to those differences to create a personalized engaging experience. To achieve this personalized game design, the authors based their research on a model called 'BrainHex' that categorizes players into 7 main archetypes based on their motivation level and how they approach the game. The seven main archetype of players were: Seeker, Survivor, Daredevil, Mastermind, Conqueror, Socializer and Achiever. To test the relationship between player types and motivation, they created a game called "Forkknight" based on the BrainHex model that tailors achievements according to the player type. The journal highlights the study conducted using this game to explore how tailored achievements impacted player's experience. The analysis used a between-subjects design, with an experimental group that received adaptive achievements tailored to their player type and a control group that received random, non-tailored achievements. There were 28 participants, with an age range of 20 to 30 years. The players first had to take BrainHex test and then play the game, then the achievements for both the groups were distributed accordingly. Then, a questionnaire was conducted to get qualitative data and IMI. The results showed that while the motivation and engagement levels did increase, there wasn't any difference in enjoyment levels. Furthermore, the document highlights the need for further research to refine the mapping of player types to achievements and to automatically infer player type (Georg Volkmar, 2019).

5. hOurworld

hOurworld is a website that follows ‘time bank’ concept where the members share their talents and services, record their time credits and spend them later on the services others provide. This review records the design, functionalities, strengths and limitations of this platform. Firstly, the design of the website is heavily informational with less user engaging features. It is similar to an official government website, which might intimidate some users in trying out the platform. The key features of hOurworld are like any other time banks, with users stating their skills and services they can offer and time credit system. It encourages localized interaction and offers a broad range of services from tutoring to health care. The notable strengths of hOurworld are its inclusivity and community engagement. It operates on multiple locations and accessible via both apps and a responsive website, demonstrating scalability and sustainability. However, with its perks, there are many limitations. The most notable weakness would be its geographic constraints, being less effective in low-density areas. Similarly, there are no advanced technologies like live location tracking and dynamic match-making, allowing users to manually type their information while creating a time bank. After the registration of the time bank, the website takes long to respond which decreases user experience. Additionally, the website relies heavily on trust, with no quality reassurance and has only basic time credit reward system which may decrease user motivation and engagement (hOurworld, 2010).

6. Time Republik

Time Republik is a digital skill sharing platform where you exchange skills and services in time credits. This systematic review evaluates the structures, features, strengths and limitations of this platform, focusing on localized service exchanges and geospatial integration. The key feature of this platform would be its global scope that connects users across different countries. The platform itself is easy to use and has better interface. It has built-in messaging system that facilitates direct communication between clients and service providers. But like any other time banks, it relies heavily on trust with limited quality control. It does take a user's location one-time, but lacks geospatial tracking to prioritize local exchanges, making the location tracking functional for only filling the user's location for requests. The filtering of skills is limited with only based on time credits and expiration date. The platform also doesn't delete the expired requests, making expired requests the majority of the requests available. It also utilizes basic reward system that may dampen the motivation of users over time. This platform is good for global scope but lacks localized options (TimeRepublik, 2012).

7. TimeBanking UK

TimeBanking UK is a platform dedicated to supporting time-banking initiatives across the United Kingdom with over 25,000 members. It is a platform that utilizes Time Online 2 (TOL2) Software, which manages time bank operations, including service postings, user registration and exchange tracking. It's key feature that most time banks don't have is that it supports the creation and management of local time banks, allowing for more localized exchanges. Similarly, the platform offers training, resources and workshops to help individuals and communities grow. However, like the two sides of a same coin, the platform also had noticeable limitations. It lacked advanced features like real-time geolocation for matching nearby users, which could improve local engagement. Likewise, the UI/UX design of the platform was too informative and confusing for first time users, which might diminish user experience. The platform also relied heavily on trust mechanisms, lacking robust verification and review systems to ensure service quality. Correspondingly, the platform does not have any extra features that might aid user engagement and motivation, making it difficult to achieve long-term engagement (Welcome to the Timebanking UK website - Timebanking UK, 2002).

Conclusion

In correspondence with the authors of “Time Banking and Its Significance”, with the similar culture and environment to India, I am certain that Nepal will also benefit immensely with the innovative concepts like time banking. Similarly, drawing from the literature review on W3C geolocation, geospatial queries, and achievement badges, HourFlow will leverage advanced W3C Geolocation APIs for precise live-location tracking. This feature will allow users to connect with nearby service providers, fostering localized exchanges and increasing accessibility. Geospatial queries will be used for filtering services based on distance, ensuring users can quickly find relevant offerings within a specified radius. To boost user engagement and intrinsic motivation, the platform will incorporate a robust achievement badge system. These badges will be tailored to different user actions, such as completing a set number of exchanges or maintaining consistent participation.

Likewise, the analysis of time bank systems such as hOurworld, Time Republik, and TimeBanking UK has revealed valuable insights for HourFlow's development. While these systems highlight inclusivity, scalability, and localized interactions, they also expose limitations such as geographic constraints, limited geospatial integration, and a lack of advanced engagement features. HourFlow aims to address these gaps by implementing live-location tracking and dynamic matchmaking to streamline local exchanges. Additionally, it will enhance user experience with an intuitive UI/UX design, robust quality assurance mechanisms, and a reward system that extends beyond basic time credits. By integrating the strengths of existing systems while addressing their limitations, HourFlow aspires to create a comprehensive and innovative platform that fosters community support and reciprocal exchange.

References

Abhishek Kaushik, V. T. (2024). Optimizing Spatial Queries in NoSQL Databases: A Comparative Analysis of B-Tree, Hashed, and Geospatial Indexing Techniques. *2024 International Conference on Knowledge Engineering and Communication Systems (ICKECS)* (p. 6). Chikkaballapur: IEEE.

Georg Volkmar, J. P. (2019). Player Types and Achievements - Using Adaptive Game Design to Foster Intrinsic Motivation. *CHI PLAY '19: The Annual Symposium on Computer-Human Interaction in Play* (p. 8). Barcelona: Association for Computing Machinery.

hOurworld. (2010). *hOurworld International Directory of Community TimeBanks*. Retrieved from hOurworld: https://www.hourworld.org/index.htm

Ms. Disha Harit, P. V. (2021). Time Banking and Its Significance . *International Journal of Creative Research Thoughts (IJCRT)*, 4.

Thomas Steiner, A. K. (2019). Geolocation in the Browser. *WWW '19: The Web Conference* (p. 6). San Francisco: Association for Computing Machinery.

TimeRepublik. (2012, April). *TimeRepublik*. Retrieved from TimeRepublik: https://timerepublik.com/search

Welcome to the Timebanking UK website - Timebanking UK. (2002). Retrieved from Timebanking UK: https://timebanking.org/