Fast Footsteps: Efficient Running Training and Tracking App

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ABSTRAK

I received a lot ofvaluable help and support during the research and writing ofthis thesis. First of all, I would like to express my special thanks to my supervisor, Professor DR. BAHARI BIN IDRUS. His professional knowledge, rigorous academic attitude and personalized guidance played a decisive role in completing this thesis. Professor DR. BAHARI BIN IDRUS not only gave me great help academically, but his patience and encouragement also gave me strong support when I encountered difficulties. I would also like to thank my family, especially my parents, for their unconditional support and understanding in my studies and life. At every stage ofmy research process, they gave me encouragement and comfort. It was their love that gave me the courage and motivation to overcome all difficulties and complete this research. Finally, I would like to thankUKM for the excellent learning and research environment provided, as well as all the teachers and classmates who directly or indirectly supported me in completing this research. I couldn't do thisjob without your help and support.

PINTRODUCTION

With In the age ofdigital transformation, the integration ofhealth and technology has never been more pronounced. As sedentary lifestyles become increasingly common due to societal and technological advancements, the requirement for efficient means of monitoring and encouraging physical activity has grown exponentially. "Fast Footsteps: Efficient Running Training and Tracking App" emanates from observing the disparity between the availability ofnumerous health tracking tools and the lack ofspecialized tools for running, one ofthe most popular and easily accessible forms ofexercise. The importance ofrunning as a holistic exercise form cannot be understated.

According to the World Health Organization (WHO), regular physical activity such as running can prevent and treat non-communicable diseases (NCDs) like heart disease, stroke, diabetes, and several types of cancer. Moreover, a study published in the Journal ofCardiovascular Prevention and Rehabilitation found that running can reduce the risk ofdeath from any cause by 27% and the risk ofdeath from heart disease by 30%. However, despite these glaring health benefits, many individuals struggle to keep track of their progress, set appropriate goals, or maintain consistency, thus underscoring the need for a dedicated running training and tracking tool. "Fast Footsteps" is conceived to bridge this gap by providing runners, both novice and seasoned, with a comprehensive tool that not only tracks their runs but also aids in efficient training.

RESEARCH METHODOLOGY

The Model-View-ViewModel (MVVM) architecture clearly separates an application into three components: user interface (View), business logic (ViewModel), and data model (Model). This separation has several advantages: Ease ofmaintenance and expansion: Changes to one component typically do not affect other components, simplifying application maintenance and expansion. Simplified and intuitive view code: Since the business logic is isolated from the view, the view code becomes simpler and easier to manage. Independence in testing: ViewModel is independent ofthe specific implementation ofView, making unit testing easier. Test business logic without writing complex UI code. Observable data objects: Leveraging observable data objects such as LiveData helps in testing logic that responds to UI changes. Data Binding Technology: This allows binding UI components directly to ViewModel properties. Data changes automatically update the UI and vice versa, without manual intervention.

Real-time data processing: MVVM improves performance by efficiently managing real-time data flows (such as speed, distance, or route mapping in running applications) through LiveData or Flow.

UI responsiveness and performance: ViewModel handles most ofthe business logic, and the UI thread is mainly focused on rendering, improving responsiveness and application

performance. Lifecycle awareness: MVVM leverages the Android lifecycle. ViewModel maintains state during configuration changes (such as screen rotation), ensuring a smoother user experience.

Promote team collaboration: The modular nature of MVVM supports team collaboration, with different members working independently on ViewModel, Model or View, reducing code conflicts. Android Jetpack Compatibility: Android Jetpack simplifies application development by providing MVVM-compatible components such as ViewModel, LiveData, and data binding.

RESULTS AND DISCUSSIONS

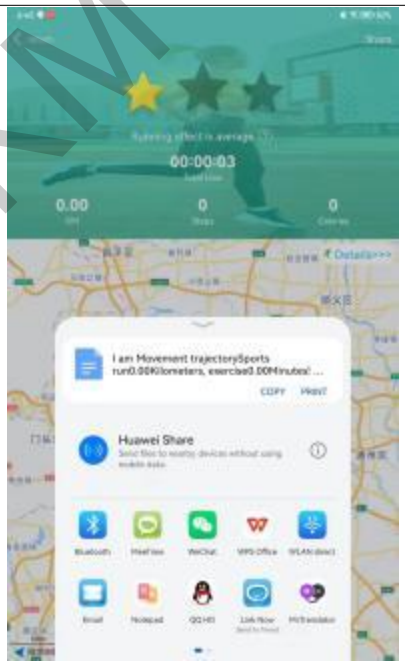
This project mainly uses Android Studio, using Java language and MySQL database storage technology to implement.

Login page This image presents a login interface where users can enter their username and password to gain access. It allows users to input their credentials securely for authentication purposes.	

Register page This image is to register to the app, user can choose their gender, insert their username, password, age, weight and height, choose their exercise goal, then click on the "REGISTER" button.	

Profile page Users can change some personal information on the profile page. They can change their username, gender, and signature. They can also change their password or log out of their account.	
Home page After logging in, the user will enter the homepage. First, there is a calendar at the top, where the user can see which day he ran. Next is the running record, where the user can view the specific content of the run. At the bottom are some notes about running. In the upper right corner is a running posture. Click this button to run. At the bottom are different buttons, namely running information, rankings, and personal information.	

Pedometer page First, it is a basic record of the total number of kilometers and time that the user has run. Then, it is a basic record of the running precautions. The user can choose how many kilometers he plans to run, and then click the "START RUNNING" button to start counting steps. The system will record the number of walking steps and exercise time through the sensor.	
Map mode Page By clicking on map mode,Users can access their location information and running routes through map mode, and their running time, distance and pace are displayed on this page.	

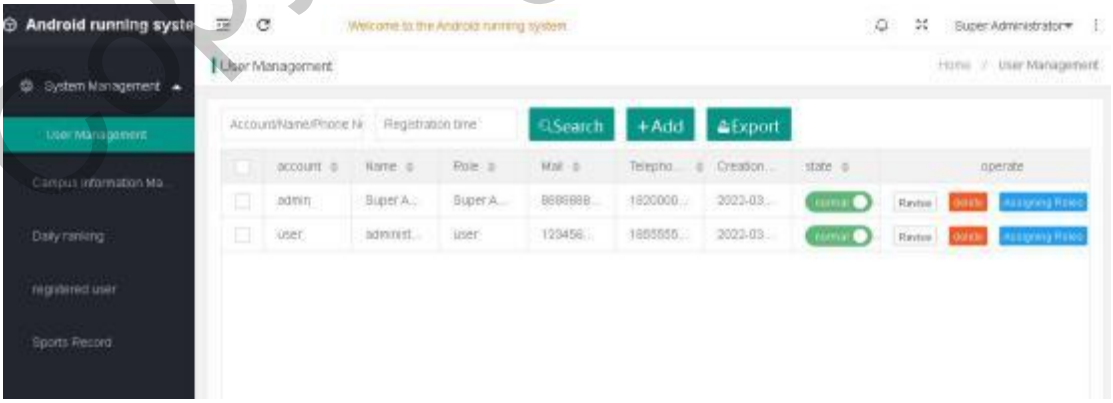
Checkout Page When the user finishes a run, he or she can obtain specific running data for the run and rate the run. Different ratings will be given based on different running results.	
Share page Users can click Share to share the information of this run with their friends through some apps, such as wahtsapp, WeChat, QQ.	

Running record page Users can click Running record to view the previous running history, including running details, running distance, running time, speed, calories burned and running route.	
Information page Users can click information to view some information and news about running.	

Ranking page When users click Ranking, they can view the specific running ranking and display the user's step count.	

Overall background design:

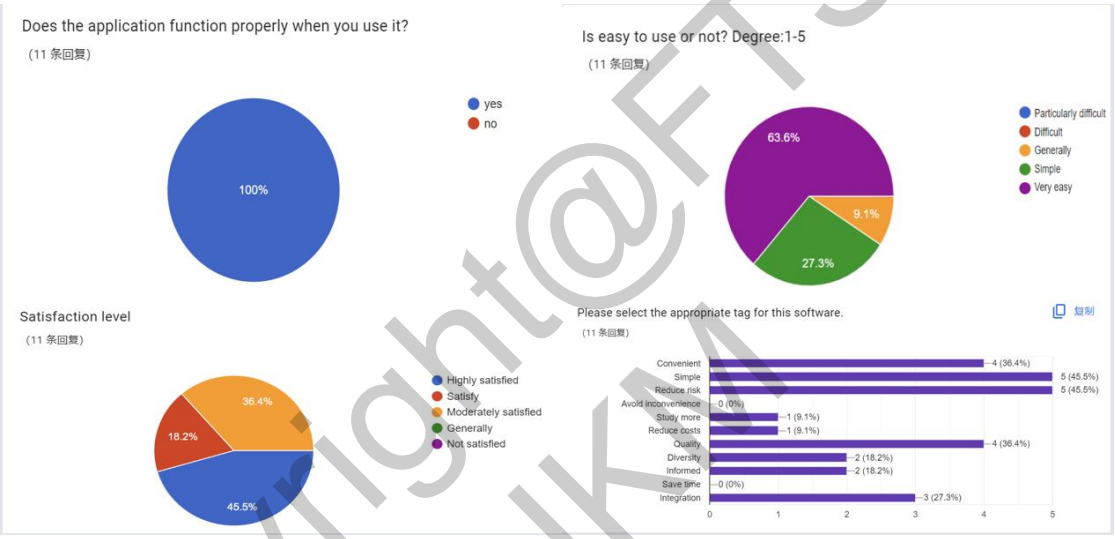
The homepage of the running management system can only be operated after logging in, including data management of APP users, running records, daily rankings, etc. The background design is divided into a left navigation bar, which contains all the operations of the system, and the middle is the area for displaying pages. When you click on a menu, it will be displayed in the blank area in the middle. The current time and the current login user name are displayed in the upper right corner.



Test

In the process of developing and maintaining Android running software, testing is a key step to ensure software quality and reliability. We will use unit testing, which verifies the smallest testable unit in the software to ensure that each functional unit can

work independently as expected. For Android running software, unit testing mainly includes the following: Functional module testing: Test each independent functional module, such as user login, running data recording, GPS positioning, etc., to ensure the correctness of each module in an isolated environment. Boundary condition testing: Test the boundary value of the input, such as the longest running time, the shortest running distance, etc., to ensure that the system can handle input in extreme cases. Regression testing will also be used. For Android running software, comprehensive regression testing is required after each update, especially focusing on the affected functional modules to ensure that the introduction of new functions will not affect the normal operation of existing functions.



The Android running software performed well in user testing, with all users (100%) confirming that it functions properly, indicating that the software has high reliability and stability. Most users (90.9%) found the software easy to use, of which 63.6% found it very easy to use, and only a few users (9.1%) reported difficulties in using it. User satisfaction was high, with 81.9% of users expressing satisfaction or high satisfaction with the software, and no user expressing dissatisfaction, showing users' overall recognition of the software.

Users paid particular attention to the ease of use and security of the software, selecting "simple" (45.5%) and "risk reduction" (45.5%) as the main labels, while "convenience" (36.4%) and "quality" (36.4%) also received high attention. In addition, some users also emphasized the software's features such as diversity (18.2%), informing (18.2%), learning more (9.1%), reducing costs (9.1%), and integration (27.3%).

Overall, the Android running software was widely recognized in terms of stability,

user experience, and functionality. Although the overall performance is positive, there is still room for improvement in some details of usability and user experience to further enhance user satisfaction and usage experience.

CONCLUSION

Following a comprehensive inspection and thorough testing of the Android running system, we can affirm that the system excels in all key parameters and offers users efficient tools for finding rentals. Nonetheless, there is always potential for enhancement in testing. Moving forward, user feedback and ongoing testing should be utilized to fulfill the essential functional requirements specified in the requirements testing phase, guarantee the development of critical functional modules like user management, running records, running positioning, and history records, and continually improve the user experience.

ACKNOWLEDGEMENT

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