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Cyclist Training Accounting Mobile Application Development

Abstract: The main propose of this article is to tell about development of the cyclist training accounting mobile application with the statistic module. The app has functions of searching, comparing records, exporting, or importing data in checked period and customizing under the user's preferences. There are fundamental methods of research that will be used such as observation and description, comparison, experiment and formalization, measurement, and object-oriented analysis. This article is covering introducing to the object domain, review of some related to developing mobile applications papers, describing methods and methodology of development mobile application, and summarizing anticipated results.

Keywords: MVC, Android, Android Studio, Java, mobile application, sport, cycling

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Разработка мобильного приложения для учёта показателей тренировочного процесса велосипедиста

Аннотация: Основная цель статьи – рассказать о процессе разработки мобильного приложения с модулем статистики для учёта тренировочного процесса велосипедиста. Приложение имеет функции поиска, сравнения записей, а также экспорт и импорт данных по выбранному периоду и настройки параметров под требования пользователя. Рассматриваются основные методы исследования такие как обзор, описание, сравнение, эксперимент, формализация, вычисления и объектно-ориентированный анализ. В статье имеется описание предметной области, раскрывается обзор источников по мобильной разработке, описываются методы и методология разработки мобильного приложения, а также представлено обобщение ожидаемых результатов.

Ключевые слова: MVC, Android, Android Studio, Java, мобильные приложения, спорт, велоспорт

Introduction

Nowadays, mobile applications play a crucial role in everyone's life. Using smartphones and tablets is the indicator of success and self-organization for lots of people because gadgets are always near us and we can make a note there at any time, tick an event in the calendar or even make changes in some documents. There are specialized apps that are convenient to use while sports activities, maintain training journal and health control. Unfortunately, there is no application among the variety of them in Play Market or App Store which is well-developed and has possessing functions that are required by potential consumers. Some apps are full of advanced features, which are rarely used, though this makes the app overweight and challenging to interact with. Other apps require a permanent network connection, sometimes it is not possible. And the most of available applications that can be downloaded for free has the trial version, which does not support opportunities for using unique functions, such as different

reports, charts and so on. These additions cost money. Therefore, people cannot choose the sports app for their wishes due to a lack of better options.

The solution about creating own application was taken to remedy the situation that was described earlier. This app must provide athletes, in particular cyclists, to account their training process. This process incudes controlling functional parameters, using the statistic module, and comparing training periods in a different season according to accounted data.

This research is made to introduce interested parties into patterns of mobile application development, how to implement the database to the app and how to make charts to explore statistics information from the user's data.

1 Description of the accounting training area

Usually athletes (cyclist) should account training data into the notebook, use notes in the smartphone or spreadsheets. So, it is difficult to remember earlier data to compare it with today's. Sometimes it is not convenient to makes such notes, but it is needed to achieve progress in training and preparing to competitions. The solution to that problem is creating the mobile application "Cyclist Diary".

The relevance of the work is in that users prefer to get some statistic information as a reaction to input in one click. Hence, developing statistic module in "Cyclist Diary" will help the cyclist to control progress independent from the network, get essential characteristic of the season and make the process of training more efficient in comparison with traditional accounting with an exercise book and a pan. Cyclists can get some useful information about total distance in the current season and their own progress. Moreover, users can upload a file which contains a summary of the week, for example, to indicate strengths and weaknesses in training to make corrections in the next session. The app will let users search through the previous practice and will make it easy to compare similar records.

It is now clear that the primary propose is to develop the mobile application with analytical functions with the way of searching and comparing records, realizing export and import necessary files and in addition giving users flexibility in customizing the app. Realization of the app gives an opportunity for extensive usage and getting more valuable information based on user's data. People can track their dependences of functional, kinematic, and power parameters, make corrections in the training plan, and achieve higher results.

This article should cover such delimitations as the technology of the developing software mobile applications; methods of achieving goals of the research, how to build a flexible application, SQL-queries for creating a database, tables, dependencies and getting data from joined tables; and graphics, charts, diagrams.

2 Literature review of technologies used in mobile development

Lots of people want to create their mobile applications or use existing analogs that are appropriate to their needs, which can make their life easier and more efficient, especially when these apps may substitute routine operations for fast and accurate computing tools. While traditionally keeping a cyclist's diary, it is hard and takes time, the accounting application should decrease users' cost and made training comfortable and visual. Although the literature is not covering this narrow area of development, there are some good papers about the process of developing mobile applications, the methodology that can be used, the possibility of giving predictions based on user's data, and examples of existing or developing sports projects.

In the earlier author's research [1] MVC methodology, integration development environment (IDE) and the library for visualization data in Android application were discussed. Basic ideas of those discussion will be briefly presented below.

MVC methodology is the universal architecture pattern that is used in application development (not only in mobile application development). This methodology suggests dividing the program into three components: Model, View and Controller. Where model is for representing logic of the program including databases, entities and so on. View is user interface (UI) components and all things connected to it. Controller is the component that is needed to interact UI with data due to different methods that runs after user's actions and helps to provide delimitation of code's functionality and simplify the development of independent components. This pattern is flexible and familiar [1].

The IDE is used in this research is Android Studio. According to the world's statistics [2] Android mobile operation system during the last five years occupies a leading position with a difference of about 50 percent from another industry giant iOS. As for the IDE, Android Studio was created special for Android development, and it has lots of useful features. Also, Android Studio is supported by Android Software Development, it is free and available. Thus, many programmers, from the beginners to professionals, are coding in Android Studio because of extensibility, opportunity to emulate gadgets or debugging on real devices. Also, it has well-understanding interface, internal version control system, unlike other environments discussed in [1].

Another thing that was presented in [1] is the library for visualization data that is going to be used in the application. GraphView library was chosen because it is easy to understand how to work with it. This library is compatible with small applications. It is worth nothing that the library has an official website with support and additional documentation, video and training examples. GraphView makes it easy to use linear, dotted, columnar and combinations of diagrams. This library has free access and full documentation on the GitHub.

3 Existing applications for sport

Previously in the paper, a short review was given about developing methods and instruments for creating mobile applications. The next part will cover general questions, comparisons of existing apps, research papers in related fields such as health and sport.

Now consider the app Runkeeper for recording outdoor sports by using GPS. It is the excellent application for personal training; it has a friendly design, it is multilingual (supports 13 languages), the user can choose sports activity, there are history and integrated music player. Apparently, it has some cons as follows: the full version is costly, you cannot use it indoor correctly, it does not apply an accelerometer; also, it is not validated [3]. Though for a cyclist diary it is not necessary to use GPS and it can be used anywhere at any time. Recommendations about maintain a cyclist diary are given in the book "The Cyclist's Training Bible" [4]. There is some useful advice on parameters that have to be accounting, what is every heart-rate zone mean, how to do your training to achieve success and more other valuable tips.

Other applications are similar to Runkeeper, such as Strava, Endomondo Sport, Garmin Connect (supports integration with Garmin bike computers), etc. Some of the other applications are tied to strength exercises, i.e. they track the frequency of performing special exercises for a certain group of muscles, in other words, they are highly specialized. The tasks for the developing application cannot be solved by existing applications on the market.

The developed application was constructed according to MVC pattern. It has the inner local database SQLite, the scheme of data shown in figure 1, all entities for database created by code and it has lots of SQL queries. Controller component is realized in separate classes and Views are screen layouts with widgets. Some screens of the "Cyclist Diary" are presented in figure 2.

4 Results anticipated of development "Cyclist Diary"

According to the survey of potential users that had been conducted earlier [5]. The results show that the accounting training application for cyclists is demanded. There are some points about what parameters potential users want to save and what type of charts they need to analyze for improvement in the training process. The developed application is working now, so users can type, save, modify, and delete their data as they wish. Moreover, users can build diagrams according to their data by chosen parameters and periods.

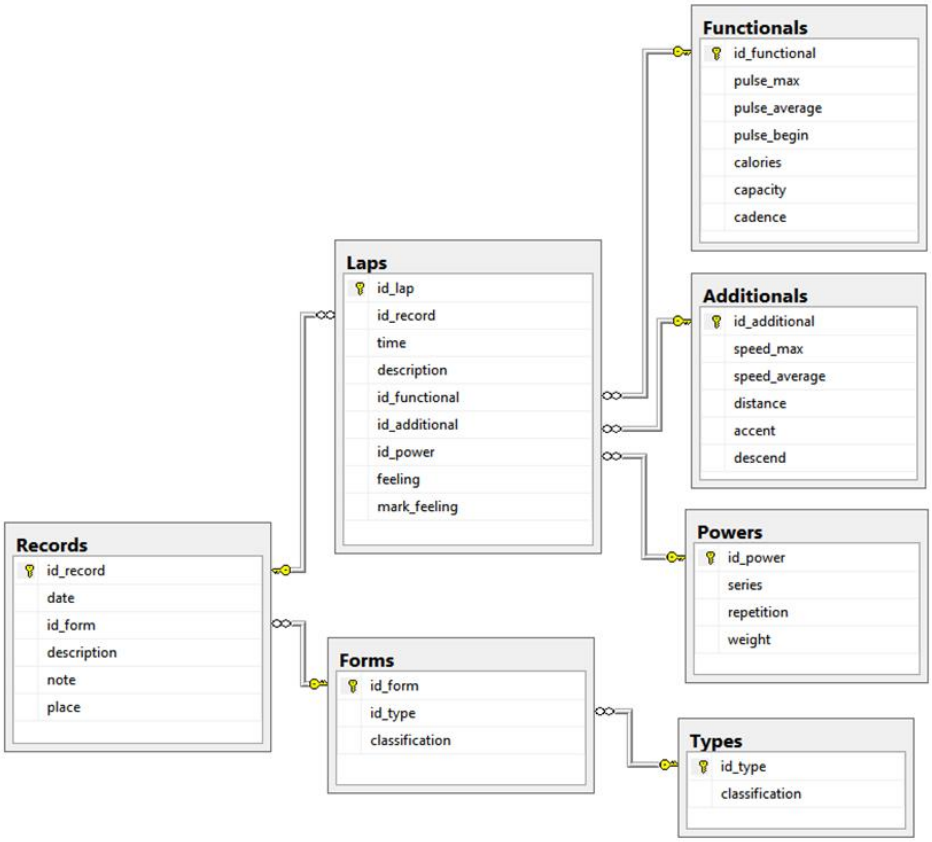

Figure 1. The database scheme for "Cyclist Diary"

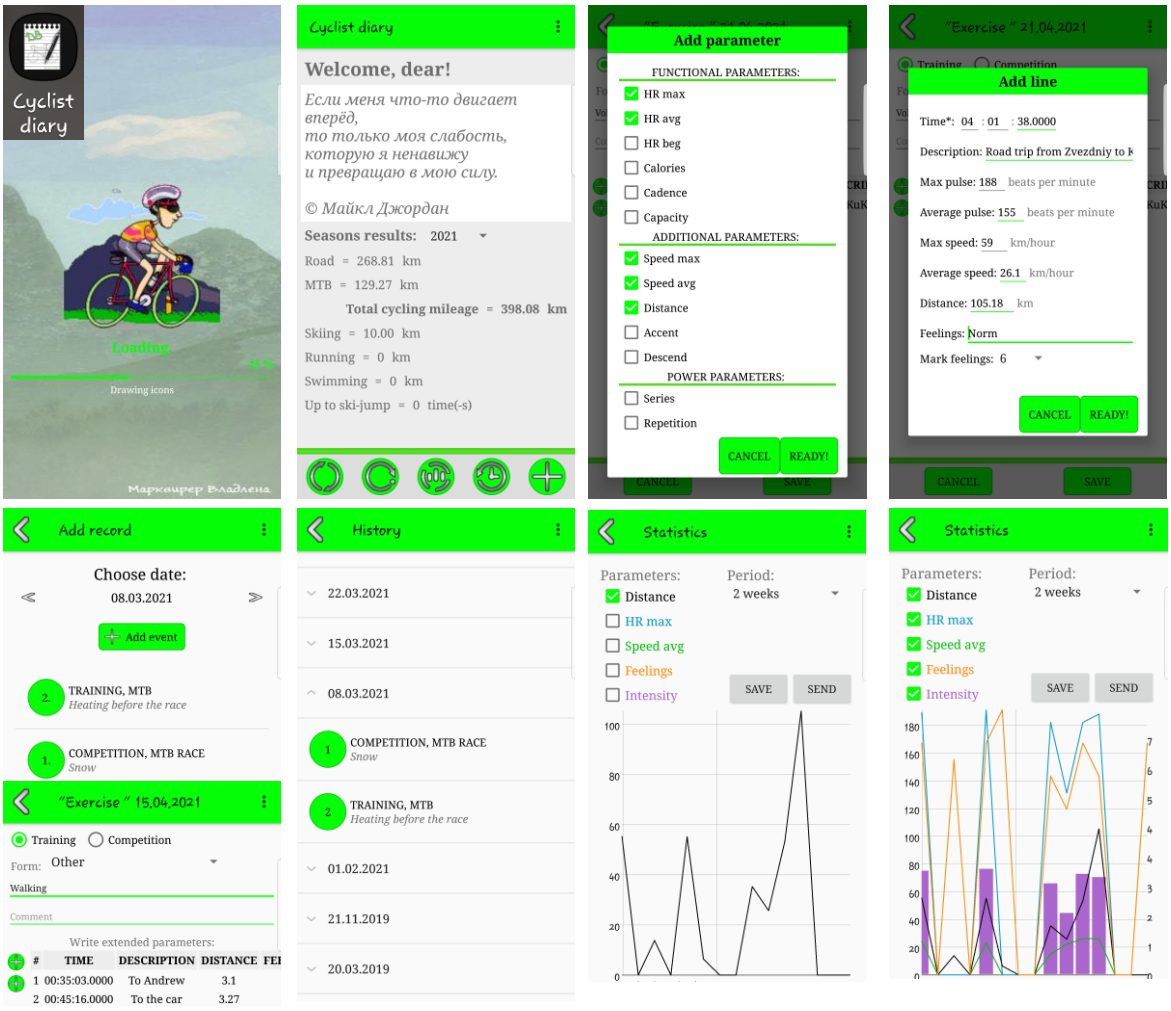

Figure 2. Screens of "Cyclist Diary"

Conclusion

To sum up of the article, it is valuable to analyze other researchers' papers to make a decision of what methodology, libraries, tools have to be used to make the development process easier and productive. In this time there were chosen Android Studio, MVC pattern, GraphView library to develop the application that is needed by athletes, in particular cyclists.

The developed application "Cyclist Diary" is working fine, but it needs some corrections. Customizing functions are partly realized. There is an opportunity of using the application either in Russian (it is also default language) or in English. It depends on basic embedded layout language which is set on the phone.

Furthermore, the application can be more automated by using internal sensors of the smartphone while adding information about training or remembering some settings of chosen parameters of training (columns). There are also some things that are not fully implemented in the app, so they need to be improved. For example, synchronization and updating the main page, setting the color theme.

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