

User Documentation for App for training analysis

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1 Introduction

In the modern era of fitness and technology, the integration of mobile applications with sports and training activities has revolutionized the way athletes and enthusiasts analyze their performance. This document introduces a mobile application designed specifically for training analysis, with a focus on cycling. The app, available on both iOS and Android platforms, provides users with comprehensive tools to upload, visualize, and analyze their cycling data.

The primary function of the app is to allow users to upload *.fit* files, which are commonly recorded by cycling computers. These files contain a wealth of information about the user's cycling activities, including metrics such as speed, distance, and elevation. Once uploaded, the app processes this data and presents it in a user-friendly interface, displaying all relevant metrics in an easily understandable format.

Beyond mere data presentation, the app offers advanced analytical capabilities. Users can view detailed plots of their performance metrics over the duration of their ride, allowing for an in-depth analysis of their training sessions. The app also includes features to calculate key performance indicators such as Training Stress Score (TSS) and Form. These metrics are crucial for athletes who are looking to optimize their training and monitor their fitness progress over time.

The inclusion of TSS calculations helps users to quantify the intensity and overall stress of their workouts, providing insights that are essential for effective training load management. Similarly, the Form calculation aids in assessing the user's current state of fitness and fatigue, enabling more informed decision-making regarding their training schedules.

2 App

When user downloads our app, this icon appears on his mobile device.

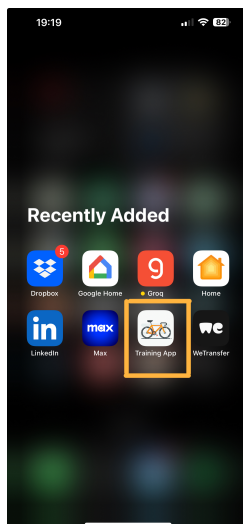


Figure 1: App icon

When user clicks on it, app will open, and loading screen will appear.

3 Log In / Sign Up Screen

3.1 Description

The Log In / Sign Up screen is the second screen you encounter when you open the app. This screen allows you to log in if you already have an account or sign up to create a new account.



Figure 2: Log In / Sign Up screen

3.2 Features

- **Log In:** Enter your registered email and password to access your account.
- **Sign Up:** Create a new account by providing your name, email, and password.
- **Forgot Password:** Reset your password by entering your registered email.

3.3 Steps

3.3.1 Log In

1. Enter your email.
2. Enter your password.
3. Tap the "Log In" button.

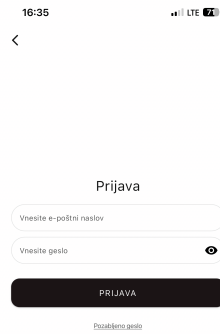


Figure 3: Log In screen

3.3.2 Forgot Password

1. Tap the "Forgot Password?" link.
2. Enter your registered email.
3. Follow the instructions sent to your email to reset your password.

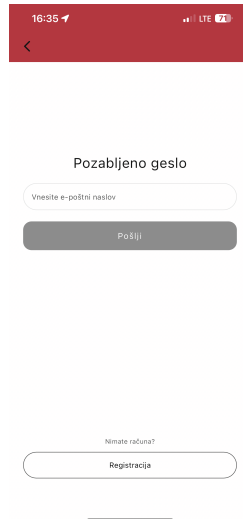


Figure 4: Forgot Password screen

3.3.3 Sign Up

1. Tap the "Sign Up" button.
2. Enter your name, email, and password.
3. Confirm your password.
4. Tap the "Create Account" button.

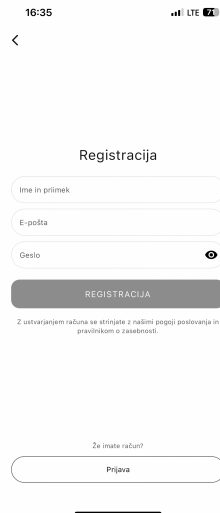


Figure 5: Sign Up screen

4 Home Screen

4.1 Description

The Home Screen is your dashboard, providing an overview of your recent activities and key metrics.



Figure 6: Empty home screen

4.2 Features

- **Recent Activities:** View a list of your most recent activities.
- **Summary Metrics:** See a summary of your total distance, time, and TSS (elevation).
- **Navigation Menu:** Access other parts of the app, including Profile and Settings.

4.3 Steps

4.3.1 View Recent Activities

1. Scroll through the list to see your latest cycling sessions.



Figure 7: Home screen with an activity

2. Tap on any activity to view detailed information.

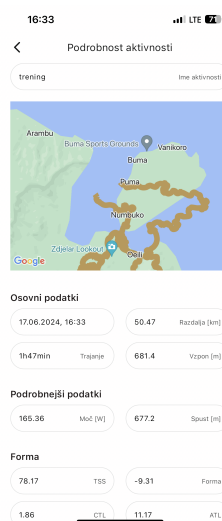


Figure 8: Detailed information about training on activity screen

4.3.2 Navigate to Other Sections

1. Use the menu icon to access Profile and Settings.

5 Adding an Activity Screen

5.1 Description

The Adding an Activity Screen allows you to upload a new .fit file from your cycling computer.

5.2 Features

- **Upload .fit File:** Select and upload your .fit file.
- **Activity Details:** Automatically display the key details of the uploaded activity.

5.3 Steps

5.3.1 Upload a .fit File

1. Tap the "Add Activity" button on the Home Screen.

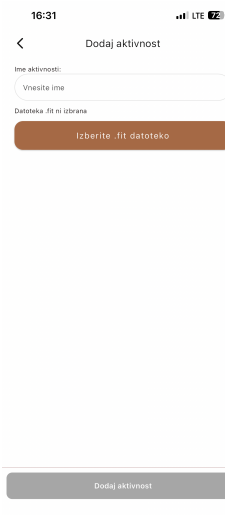


Figure 9: Screen for uploading activity ".fit" file

2. Select the .fit file from your device storage or connected cloud service.

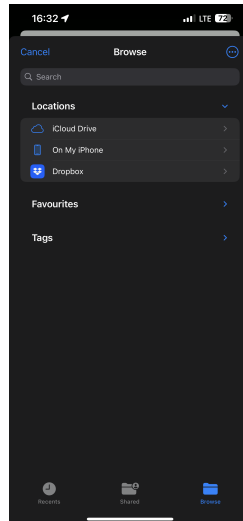


Figure 10: Native iOS file selector.

3. Choose name and confirm the upload.

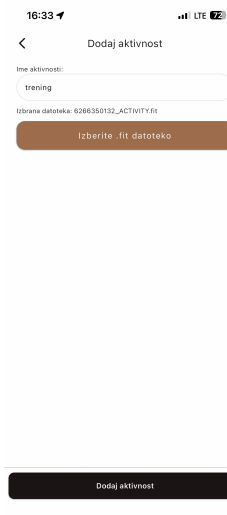


Figure 11: Add name and confirm upload

6 View Activity Details

1. After uploading, the app will process the file and display the key metrics, including speed, distance, and elevation. If training ride has GPS enabled, user can check his course on map, zoom in and zoom out for more precise view.

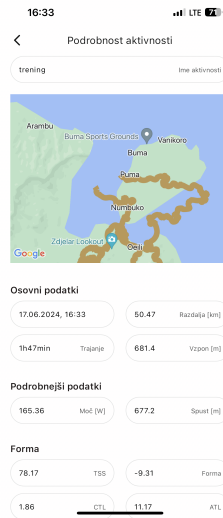


Figure 12: Training screen

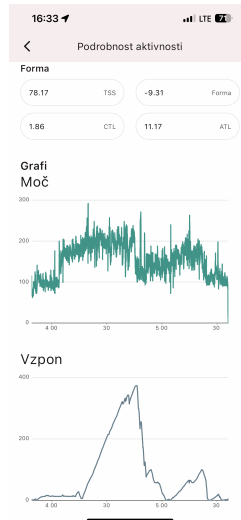


Figure 13: Training screen (data plots)



Figure 14: Training screen (data plots)

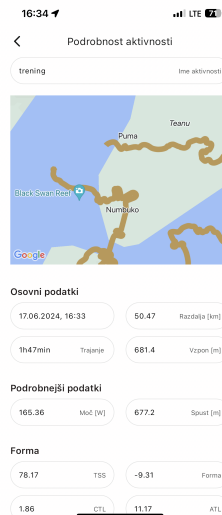


Figure 15: Training screen with map zoom

7 Metrics

7.1 Speed

- **Average Speed:** The average speed is calculated by dividing the total distance traveled by the total time taken. It can be expressed as:

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

- **Maximum Speed:** The highest speed reached during the ride.

7.2 Duration

- **Duration:** The total time spent cycling, from start to finish.

7.3 Elevation

- **Ascent:** The total elevation gained during the ride.
- **Descent:** The total elevation lost during the ride.

7.4 Power

- **Average Power:** The mean power output over the duration of the ride.
- **Normalized Power (NP):** A more accurate representation of the physiological cost of the ride, accounting for the variability in power output. It is calculated using a rolling 30-second average of power output, raising it to the fourth power, averaging these values, and then taking the fourth root:

$$\text{NP} = \left(\frac{1}{N} \sum_{i=1}^N (\text{Power}_{i,30s})^4 \right)^{\frac{1}{4}}$$

- **Maximum Power:** The highest power output achieved during the ride.

7.5 Form

Form is an important concept in cycling as it helps to determine how prepared and rested a cyclist is for performance. It is influenced by both recent and long-term training loads. Key metrics that contribute to understanding form include:

- **Form Trend:** This metric indicates how well-rested and prepared a cyclist is for performance. It's calculated by subtracting the Acute Training Load (ATL) from the Chronic Training Load (CTL):

$$\text{Form Trend} = \text{CTL} - \text{ATL}$$

A positive Form Trend suggests the cyclist is well-rested and ready for high performance, while a negative value indicates fatigue.

- **Training Stress Score (TSS):** TSS measures the total training load and is calculated based on the intensity and duration of a ride. It can be calculated as:

$$\text{TSS} = \frac{\text{Duration} \times \text{Average Power} \times \text{Intensity Factor}}{\text{FTP} \times 3600} \times 100$$

where FTP is the Functional Threshold Power, and Intensity Factor (IF) is the ratio of the ride's normalized power to FTP. TSS quantifies the overall stress placed on the body during a ride.

- **Chronic Training Load (CTL):** CTL represents the long-term training load and is calculated as the exponentially weighted average of TSS over a longer period, typically 42 days. It gives an indication of an athlete's fitness level:

$$\text{CTL}(t) = \frac{\text{TSS}(t) + \text{CTL}(t-1) \times (1 - e^{-\frac{1}{42}})}{1 + e^{-\frac{1}{42}}}$$

Here, t is the current day, and $t - 1$ is the previous day.

- **Acute Training Load (ATL):** ATL represents the short-term training load and is calculated as the exponentially weighted average of TSS over a shorter period, typically 7 days. It gives an indication of an athlete's fatigue level:

$$\text{ATL}(t) = \frac{\text{TSS}(t) + \text{ATL}(t-1) \times (1 - e^{-\frac{1}{7}})}{1 + e^{-\frac{1}{7}}}$$

Similar to CTL, t is the current day, and $t - 1$ is the previous day.

8 Conclusion

Thank you for using the Training Analysis App. We hope this documentation helps you navigate through the app and make the most of its features. For any further assistance, please contact our support team via GitHub. Happy cycling!