

User Guide CS4900

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Introduction

For cross-country runners, understanding and monitoring heart rate is essential for optimizing performance and avoiding injuries. Accurate heart rate data can:

- Measure current fitness levels
- Predict and prevent overtraining
- Guide personalized workouts

However, most fitness devices fall short when it comes to providing predictive insights tailored to individual run characteristics.

Enter PulseRun—a program designed to fill this gap. PulseRun leverages your historical **GarminConnect** data and a machine learning model to predict both your average heart rate and max heart rate for future runs. By inputting these key parameters:

- Upwards Elevation (ft)
- Downwards Elevation (ft)
- Pace (min/mile)
- Distance (mile)

You'll gain actionable insights into your expected performance, allowing you to plan runs smarter and train more effectively.

PulseRun is a solution for runners who want to take their training to the next level.

Prerequisites

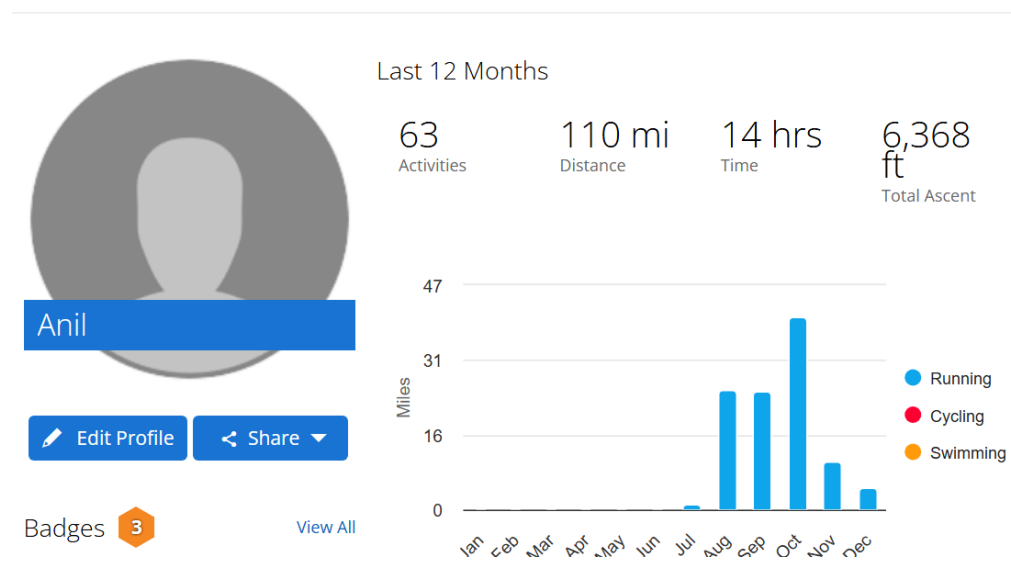
Before you begin, ensure you have the following:

Software Requirements:

- A computer with **Windows, macOS, or Linux**.
- **Python 3.8+** installed on your system.
- **Latest version of pip**

```
pip install --upgrade pip
```

- An existing **Garmin Connect account** with historical data available



View Profile Page of a Garmin Connect Account

Installation Guide

1. Clone the repository:

```
C:\Users\mvnal>git -c http.sslVerify=false clone https://github.ncssm.edu/chintapalli25a/PulseRun
```

- Once the repository is cloned, re-enable SSL verification for safety:

```
C:\Users\mvnal>git config --global http.sslVerify true
```

2. Cd into PulseRun

```
C:\Users\mvnal>cd PulseRun
```

3. Create and activate a virtual environment (venv)

```
C:\Users\mvnal\PulseRun>venv\Scripts\activate  
(venv) C:\Users\mvnal\PulseRun>
```

4. Install the required Python packages by downloading the **requirements.txt**

```
(venv) C:\Users\mvnal\PulseRun>pip install -r requirements.txt
```

5. Launch the program

```
(venv) C:\Users\mvnal\PulseRun>streamlit run uiv2.py  
  
You can now view your Streamlit app in your browser.  
  
Local URL: http://localhost:8501  
Network URL: http://10.50.60.123:8501
```

The **Streamlit** interface will open in your default web browser.

Using the Program

Follow these steps in the browser:

- **Log in:** Enter your **Garmin Connect username** and **password** to fetch historical data.

Garmin Connect Credentials

Garmin Connect Email

anilchintapalli@outlook.com

Garmin Connect Password

.....



- **Input parameters:**
 - Enter the **start date** and **end date** from which you want the model trained on

Activity Date Range

Start Date

2020/09/09

End Date

2024/12/08

- Enter the **route feature values** the model will predict your heart rate from

Route Features

Distance (mi)
5.00 - +

Elevation Gain (ft)
30.00 - +

Average Pace (min/mi)
7.50 - +

Elevation Loss (ft)
100.00 - +

Predict Performance

- Select the “Predict Performance” button which should then output the predicted average heart rate, max heart rate, and biometric features

Prediction Successful!

Predicted Average Heart Rate

174.3 bpm

Predicted Max Heart Rate

198.9 bpm

Predicted Biometric Features

Calories: 425.66

Activity Training Load: 215.63

Avg Power: 268.26

Avg Cadence (steps/min): 162.80

Avg Vertical Oscillation: 10.72

Avg Stride Length: 124.72

Avg Ground Contact Time: 260.83

Total activities used for prediction: 1000

Troubleshooting

Error with the packages downloading: **Try to download each command separately (sometimes it can be an issue if your pip isn't upgraded)**

- pip install pandas
- pip install numpy
- pip install tensorflow
- pip install sklearn
- pip install streamlit
- pip install requests
- pip install garminconnect
- pip install sdv

Privacy

At PulseRun, we understand the importance of keeping your personal data secure. Our program requires users to log in with their Garmin Connect username and password to fetch historical data. To ensure the privacy and safety of this information, we leverage Streamlit's secure execution environment:

1. All data entered into the program is processed and stored only on your local machine.
2. Streamlit ensures secure handling of inputs within the application, reducing the risk of interception.
3. Once the session ends, your login credentials are not retained or stored anywhere in the application.