

Developing an App to Measure the Blink Rate While Using a Computer

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Abstract

People around the world rely on computers every day to complete a wide variety of tasks, but frequent computer use can negatively impact the human body. One common issue is eye strain, as prolonged screen time can cause the eyes to become dry and fatigued. Blinking is essential for maintaining ocular homeostasis because it keeps the eye's surface properly lubricated. Research by Ousler et al. (2014) shows that individuals with dry eyes spend more time with their eyes closed each minute than those without dry eyes in order to maintain this balance.

This study focuses on blinking behavior and examines whether blink frequency during computer use varies depending on the time of day. Understanding these patterns is important for supporting eye health, especially as digital device use continues to rise. However, accurately measuring blink rates is difficult without technological assistance.

To address this challenge, I developed a Python application to detect and track blink frequency. In this pilot study, the app will record blink rates during three time periods—morning, afternoon, and night. The long-term goal is to create a tool that alerts users when their blink rate falls outside normal ranges, helping them make informed decisions and reduce the risk of eye strain.

Methods

An application was developed in Python using the OpenCV library. The program first detects a human face and then identifies the eyes. Once the eyes are located, it monitors and records each blink.

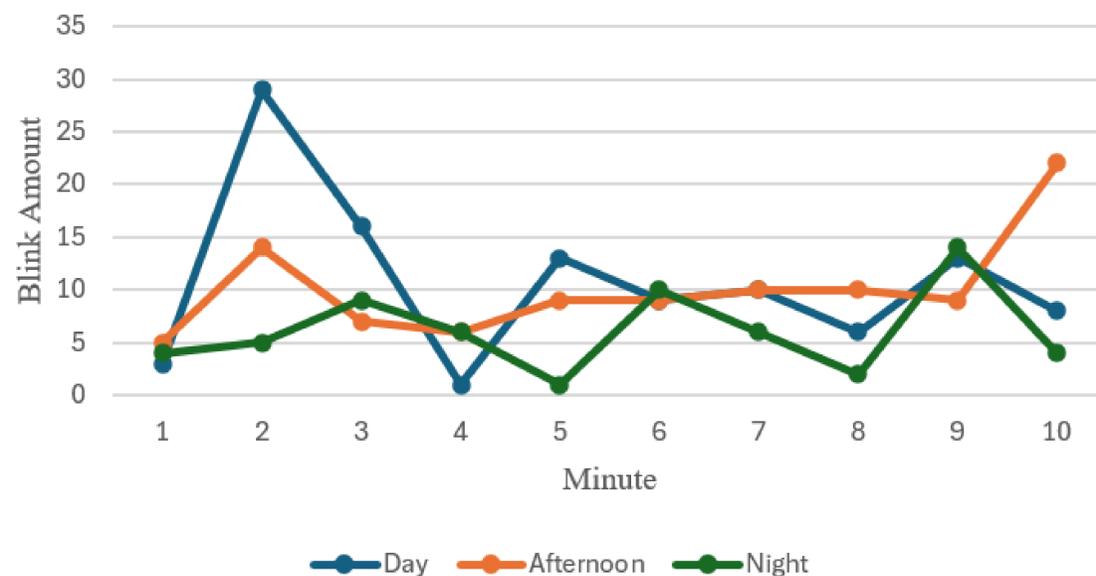
In this pilot study, my goal is to determine my average blink rate across two variables: time of day and type of activity. To do this, I used the app to collect blink-rate data during three daily time segments (morning, afternoon, and evening) while performing three different types of tasks (entertainment, intense reading, and studying). For each time-and-task combination, I recorded my blink rate over a 14-minute session. I then aggregated the data to calculate the average blink rate for each condition.

Data

Blink rate per minute (Day, Afternoon, Night)

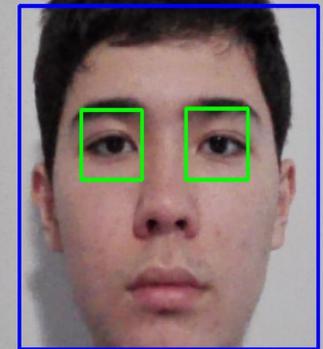
Studying	10.8	10.1	6.1
Reading	6.3	5.0	7.1
Entertainment	8.4	6.5	5.9

Blink Amounts Each Minute (Studying)



Blinks: 14

Seconds since last blink: 0



You blinked less than the average blink rate in the last minute.
Last minute blink count: 6

Discussion

The data indicates that as the day goes by, the blink rate while using a computer also dropped in all uses between day and afternoon. Comparing the afternoon to night, however, while the blink rate of studying decreases by some, the blink rate of entertainment and reading goes up. This indicates that while blink rate overall does decrease as the day goes on, there may be other factors at play which influences the blink rates, as seen with the night data. The graph also indicates that the frequency of blinks that happen each minute can vary.

Next Steps

I would like to develop this app further to be able to warn users when the risk of eye strain while they are using the computer. The app would have the same function of recording blinks each minute but also have additional feature such as comparing it to the average blink rate, then send a notification to the user if it has been low for several minutes.