



The purpose of this deck is to fulfill the requirement of DSI #39, Capstone Project.

Role: Budding social entrepreneur and data scientist

Audience: Investors, Businesses, General Public

Problem Statement: In today's age where our attention is the major currency, how can we take back our attention and remain focused in our tasks? At the same time, how can we make sure we do not over-exert?

Done by: Jackie Seah



Productivity State Developer (PSD)

by Jackie Seah

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**Do you have these applications on
your phone?**



Social media use is highly prevalent in Singapore

5.08m

Social media
users in
Singapore

2h 13min

Average time
spent on social
media daily

7.1

Average number
of different social
media platforms
used in a month

Social media apps are useful, but comes at a cost



Microsoft Canda, Consumer Insights (2015)

"Long-term focus erodes with increased digital consumption, social media usage, and tech savviness."



Media Multitasking and Cognitive, Psychological, Neural, and Learning Differences (2018)

"... growing body of evidence demonstrating that heavy media multi-taskers show differences in cognition, psychosocial behaviour, and neural structure."



*Did you know? Microsoft's 2015 research suggested that the average human attention span drop from **12sec** in 2000 to **8.25sec** in 2015. That of a goldfish is **9sec**.*

Source:

1. Attention Spans, by Consumer Insights, Microsoft Canda (2015)
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5658797/>

Problem

In today's age where our attention is the major currency, how can we take back our attention and remain focused in our tasks?

“The successful warrior is the average man, with laser-like focus.”

- **Bruce Lee**



Problem

In today's age where our attention is the major currency, how can we take back our attention and remain focused in our tasks?

At the same time, how can we make sure we do not over-exert?

Proposed Solution

A tool that helps users identify, quantify their productive states and provide tips on how to improve. At the same time, it will also detect signs of fatigue.

Process



1

Definition & Data Source

Defining the classes and sourcing for the data



2

Data Processing

Extracting the features from the data source



3

Modelling

Training a classification, machine learning model.



4

Web Application

Designing a user-friendly tool to deploy the model to the users.

Definitions & Data Source

Productivity

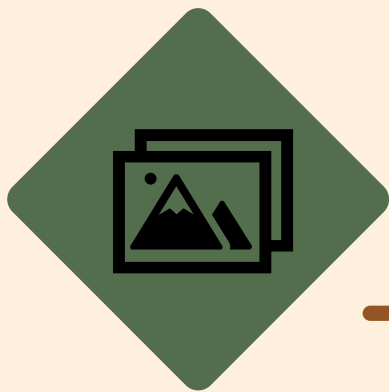
- “Productive” is defined as the subject is performing a task on their electronic device and is looking at the centre of the screen.
- Known limitation: Does not consider multiple screen nor does it dictate what the subject is doing on their electronic device.

Fatigue

- “Fatigue” is defined as the subject is yawning, specifically eyes closed and mouth open.
- Known limitation: Does not consider other signs of fatigue like if the subject is nodding off.

Data Source: Video recordings of self in 720p (1280x720), 16:9, 30fps, mp4

Data Processing

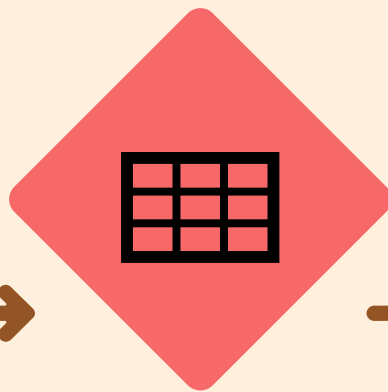


Slice video into frames



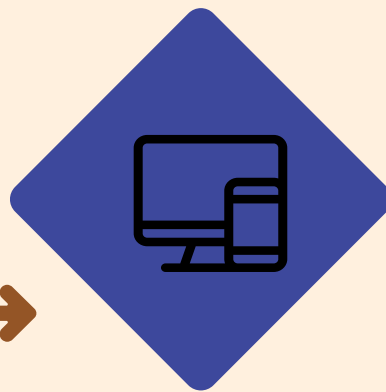
Detect landmarks

There are 468 landmarks within the face_mesh



Extract Coordinates

For each landmark, extract its x, y, and z coordinates



Classification Model

The coordinates are then fed into the machine learning model

“Ridge Classifier” was selected as the final model

	“Productivity” Model				“Fatigue” Model			
	Accuracy (Train)	Accuracy (Test)	Accuracy (Cross Validation)	Runtime (sec)	Accuracy (Train)	Accuracy (Test)	Accuracy (Cross Validation)	Runtime (sec)
Logistics Regression	> 0.95	> 0.95	> 0.95	0.069	> 0.95	> 0.95	> 0.95	0.084
Ridge Classifier	> 0.95	> 0.95	> 0.95	0.031	> 0.95	> 0.95	> 0.95	0.053
Random Forest	> 0.95	> 0.95	> 0.95	0.280	> 0.95	> 0.95	> 0.95	0.417
Gradient Booster	> 0.95	> 0.95	> 0.95	8.148	> 0.95	> 0.95	> 0.95	14.254

Evaluation Criteria:

- Accuracy Score: Closer to 1, the better.
- Train vs Test Score: Difference of less than 0.1 suggest no sign of overfitting
- Cross Validation: Closer to 1 suggest model will have good generalisation.
- Runtime: Lower the better.

Demo



<https://laser-focus.streamlit.app/>

Summary

Problem: In today's age where our attention is the major currency, how can we take back our attention and remain focused in our tasks? At the same time, how can we make sure we do not over-exert?

Result:

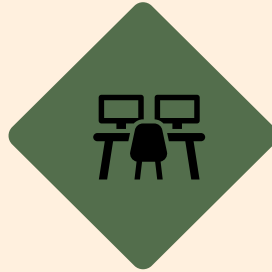
- 2 classification models that are accurate, reliable, and shows consistent performance across different datasets.
- A “live” web application that allow users to upload, analyse their own data, and get tips on how they can improve.

Future work aims to improve model and explore other use cases



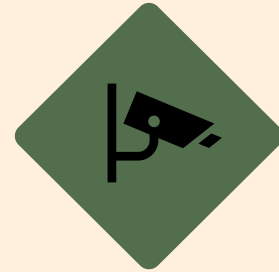
Improve fatigue classification

Expand from a binary classification into a scale. (e.g. 7-point Stanford sleepiness)



Improve productivity detection

Consider more practical constraints like use of a secondary monitor.



Alternative Use Case

1. Monitoring of off-site employees.
2. Detect early signs of burnout in employees

The background is a light beige color. It features several decorative elements: wavy, cloud-like shapes in a muted tan color at the top left, top right, and bottom left; a solid tan circle in the top right corner; and a thin, light tan circular outline in the bottom right corner.

**Thank you
for your
attention**