BACKGROUND

MIDDLE SCHOOL STUDENTS

57.8% REPORTED INSUFFICIENT SLEEP

12% REPORTING SLEEPING FEWER THAN 6 HOURS A NIGHT

HIGH SCHOOL STUDENTS

72,7% REPORTED INSUFFICIENT SLEEP

20% REPORTING SLEEPING FEWER THAN 6 HOURS A NIGHT

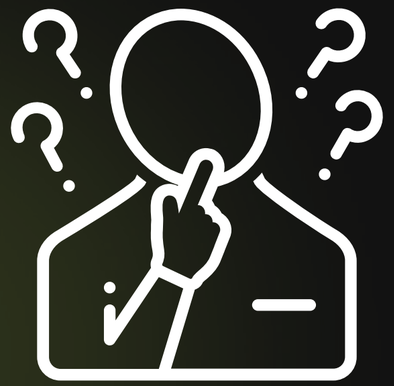
DETECTING SLEEP BEHAVIOURS IN CLASS USING OPENCV PROGRAMMING

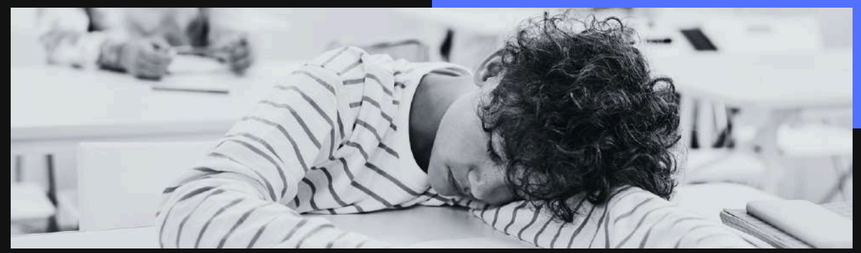
RESEARCH REPORT

ALETA JOSEPHINE LUKMAN/XII.1 - 02
FELISHA ANGELINE/XII.5 - 09

PROBLEM STATEMENT

- Students sleeping in class
- Disturbing teachers
- Concerning behavior
- Affecting their academics



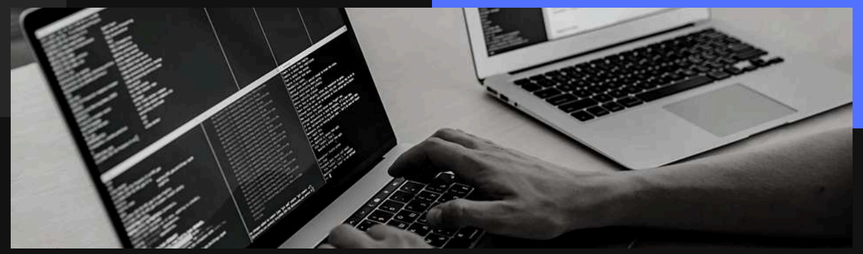


Research Questions

1. Can the programme detect students sleeping in class?
2. Is the programme effective enough to detect students sleeping in class?

Purpose of Research

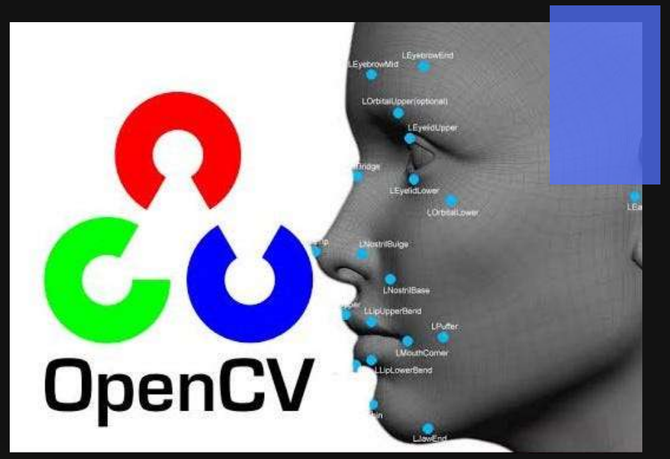
To create a program that will be able to help detect students that are asleep in class



BENEFIT OF RESEARCH

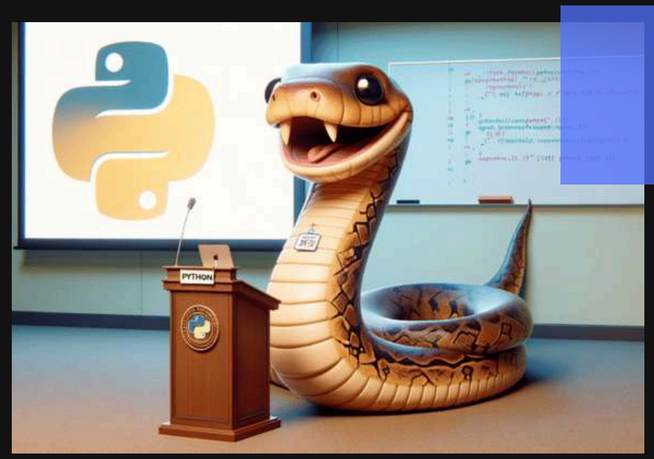
- To detect students sleeping in class
- Easier sleep detecting in class
- More attention towards students sleeping in class

BASIC THEORY



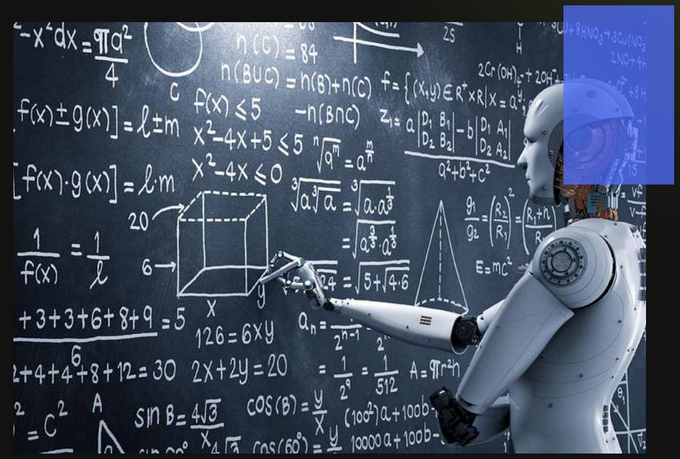
OpenCV Library

- Free software library that provides tools for computer vision and machine learning tasks
- Wide range of functions for image and video processing, such as detecting faces and objects



Python Programming Language

- Open-source programming language known for its simplicity and readability.
- Used for a variety of tasks, such as **web development, data analysis, and scripting**.
- Easy to use and integrate with other software

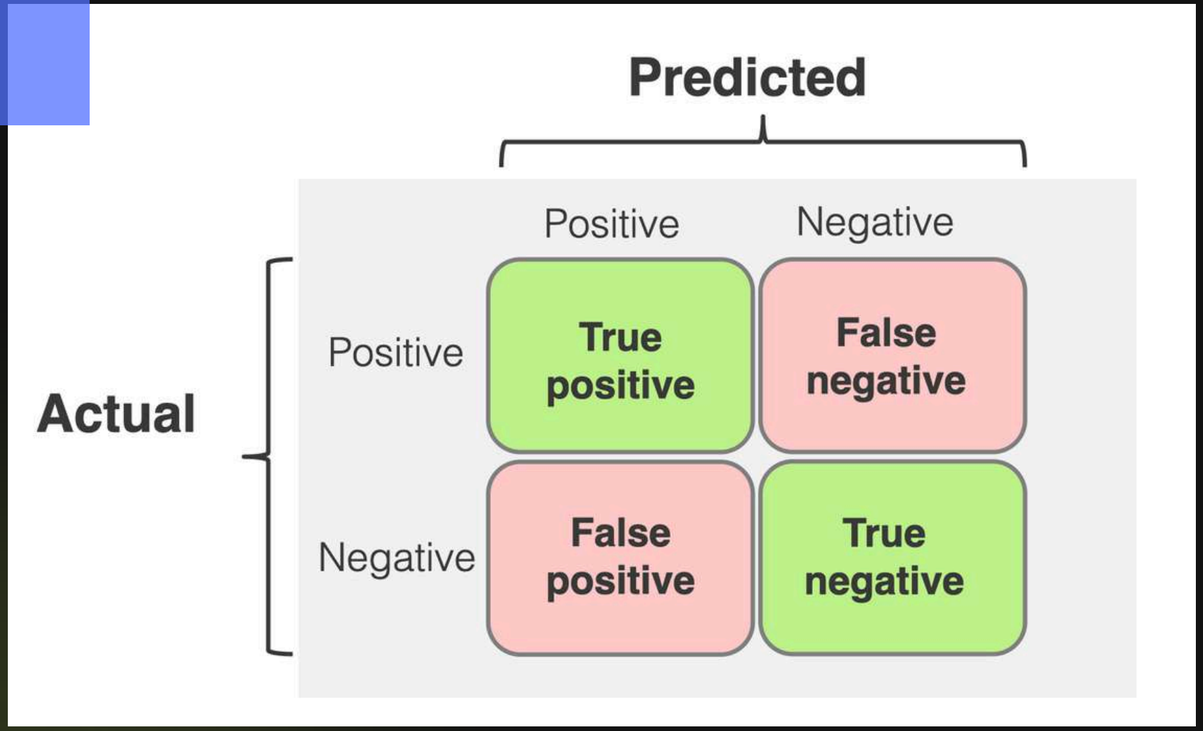


Machine Learning

Machine learning is a field of artificial intelligence where computers are trained to learn from data and make predictions or decisions without being explicitly programmed for specific tasks.

BASIC THEORY

Confusion Matrix



$$Accuracy = \frac{TP+TN}{Total}$$

$$Recall = \frac{TP}{TP+FN}$$

$$Precision = \frac{TP}{TP+FP}$$

$$F1 - Score = \frac{2 \times precision \times recall}{precision+recall}$$

RESEARCH METHODOLOGY

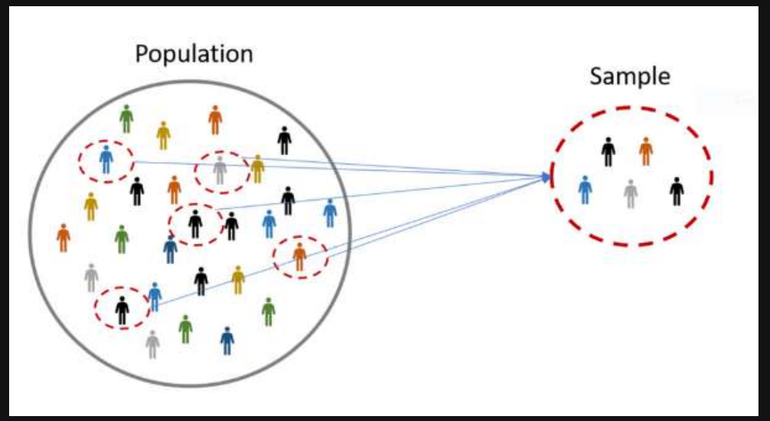
01

Time:
September - November

02

Place:
Santa Laurensia Alam Sutera

MATERIALS



PROCEDURE

1. Create a program to capture images (dataset) from a webcam
2. Set the output directory according to the desired category (create subdirectories for "asleep" and "awake")
3. Define the desired count of images to capture for each category
4. Execute the program to capture and save the images based on user input.
5. Create a new program to capture images from the webcam for prediction
6. Preprocess the captured image to match the input requirements of our model

PROCEDURE

7. Use the pre-trained model to predict the label of the captured image

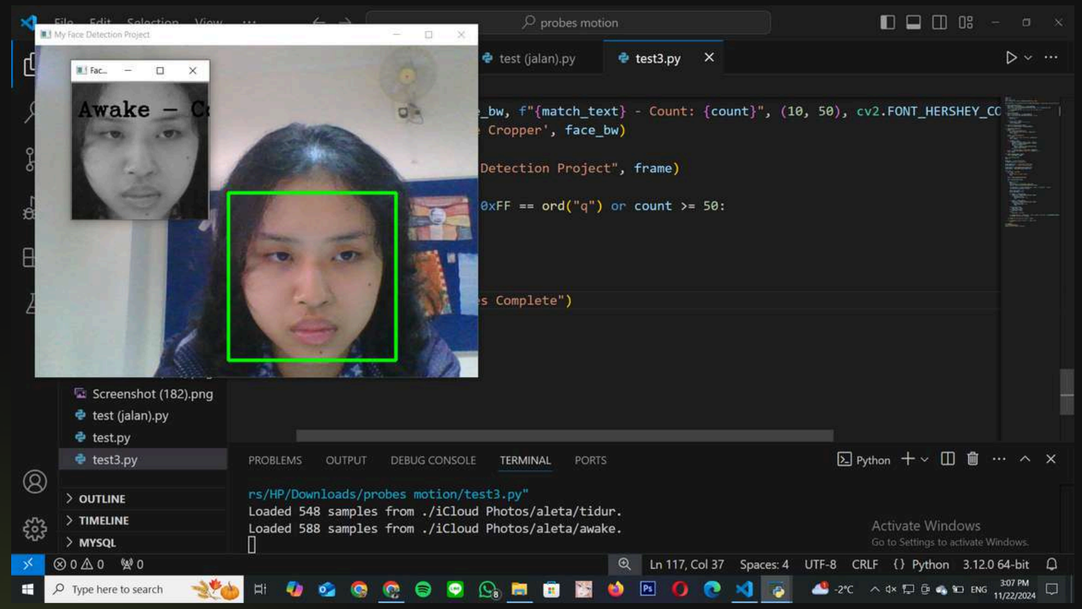
8. Compare the predicted label with the actual labels in the dataset

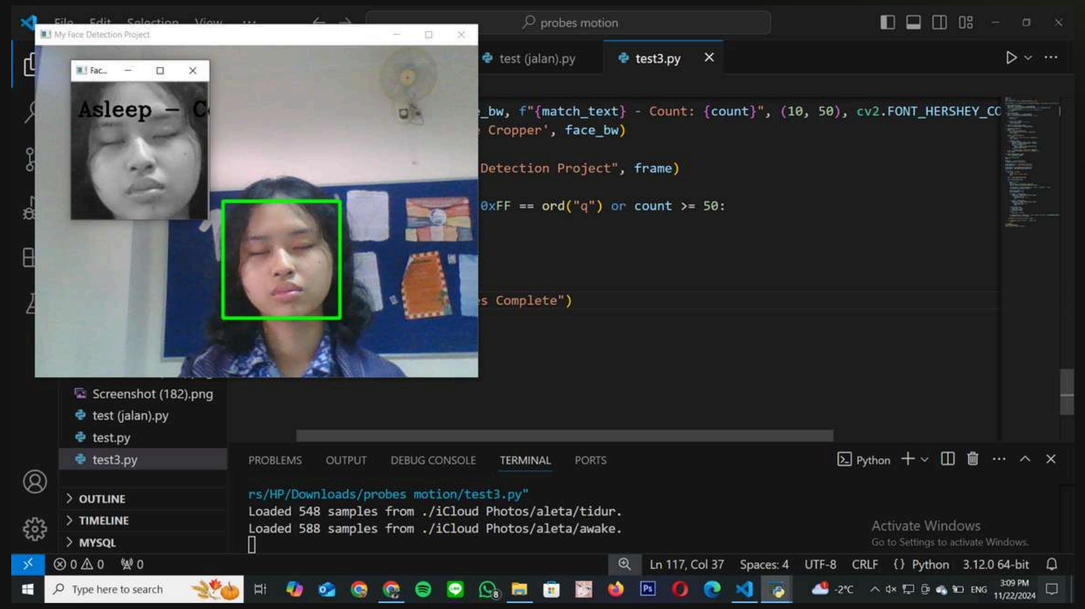
9. Collect predicted and true labels for evaluation

10. Use a confusion matrix to assess the model's performance

11. Visualize the confusion matrix to understand the classification results

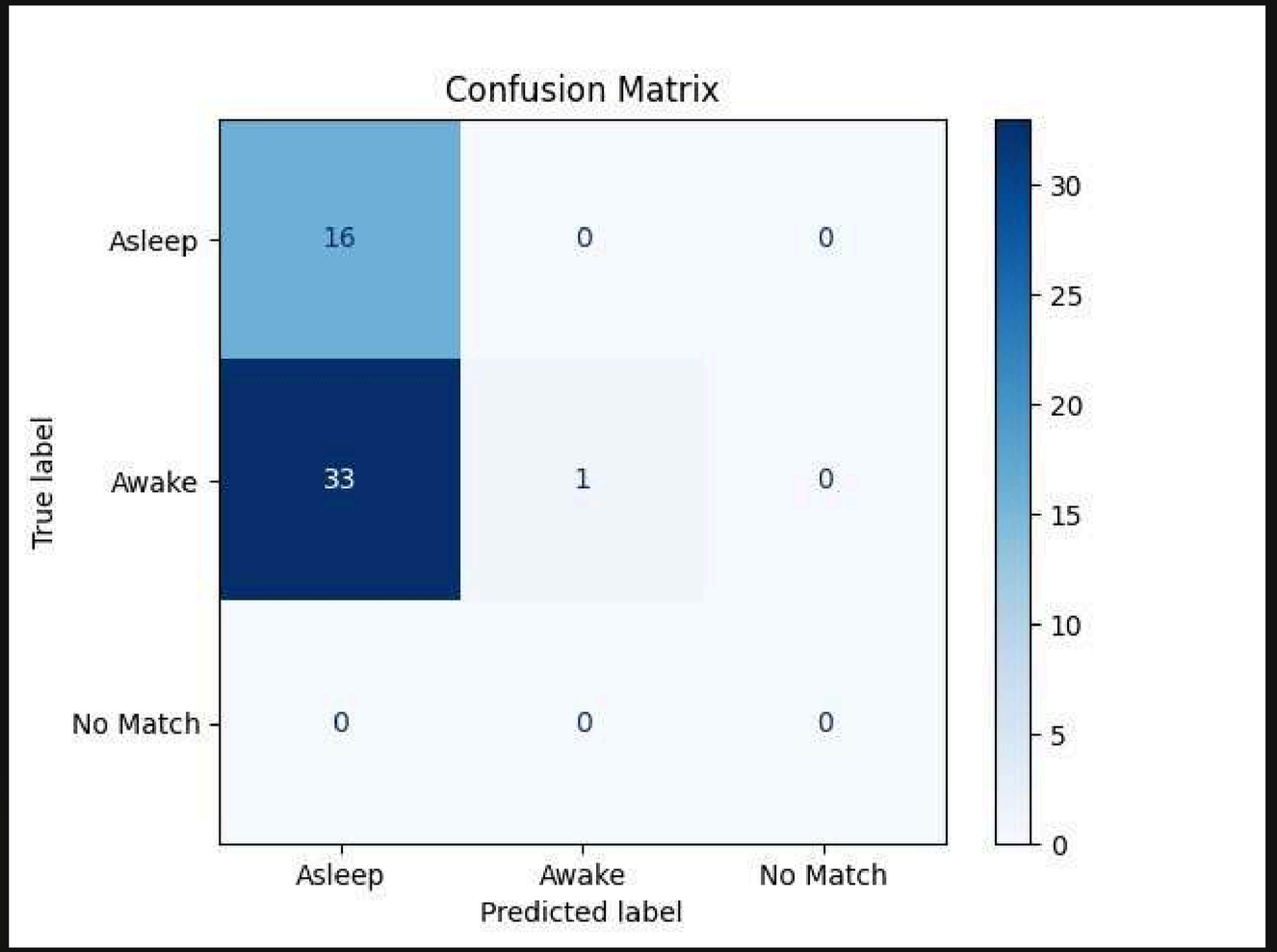
DATA & ANALYSIS





DATA & ANALYSIS

100 Sample Data

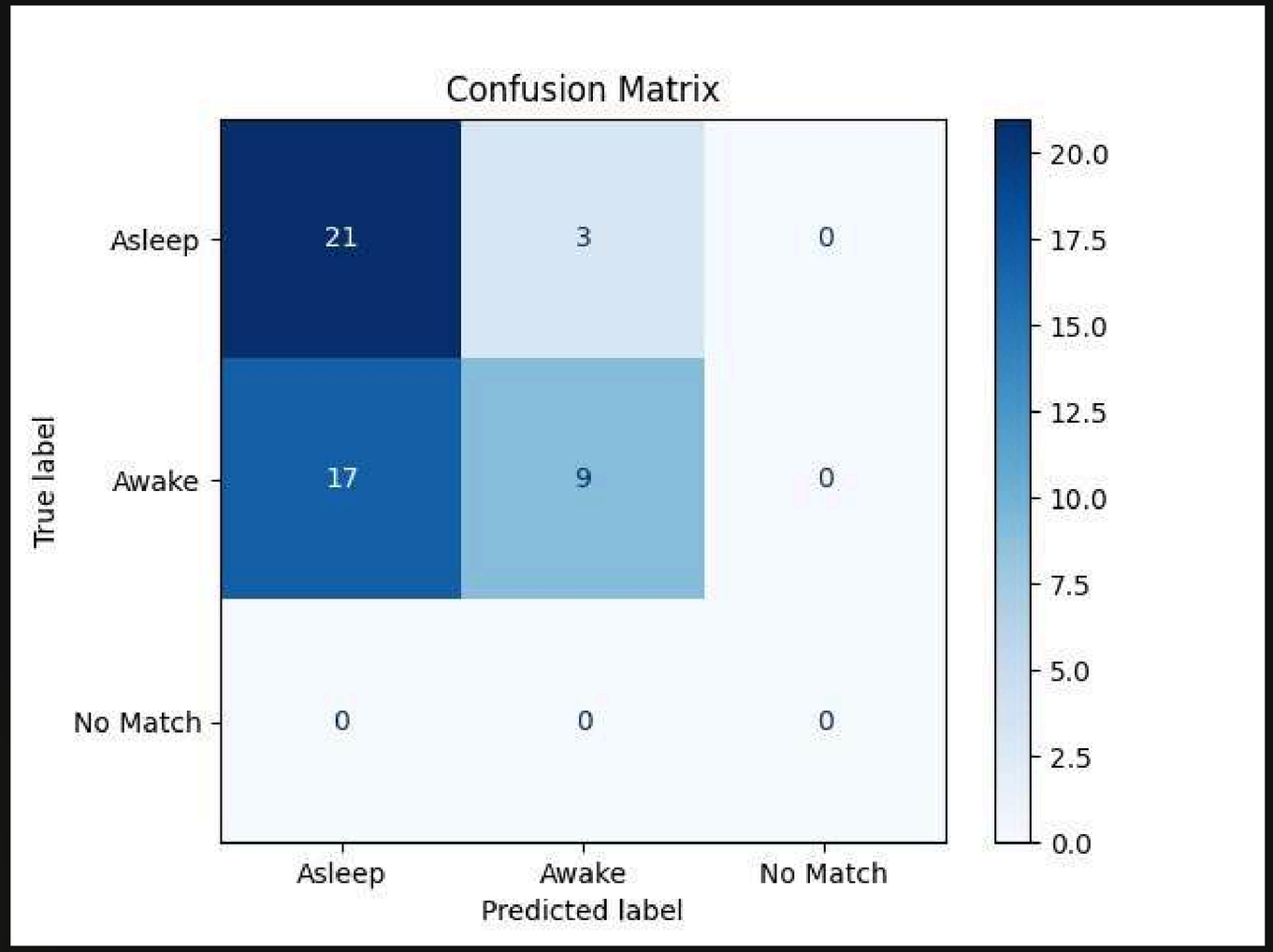


DATA & ANALYSIS

	Precision	Recall	F1-Score	Accuracy
Asleep	32.6%	100%	49.2%	34%
Awake	100%	2.9%	5.7%	
No Match	-	-	-	

DATA & ANALYSIS

300 Sample Data

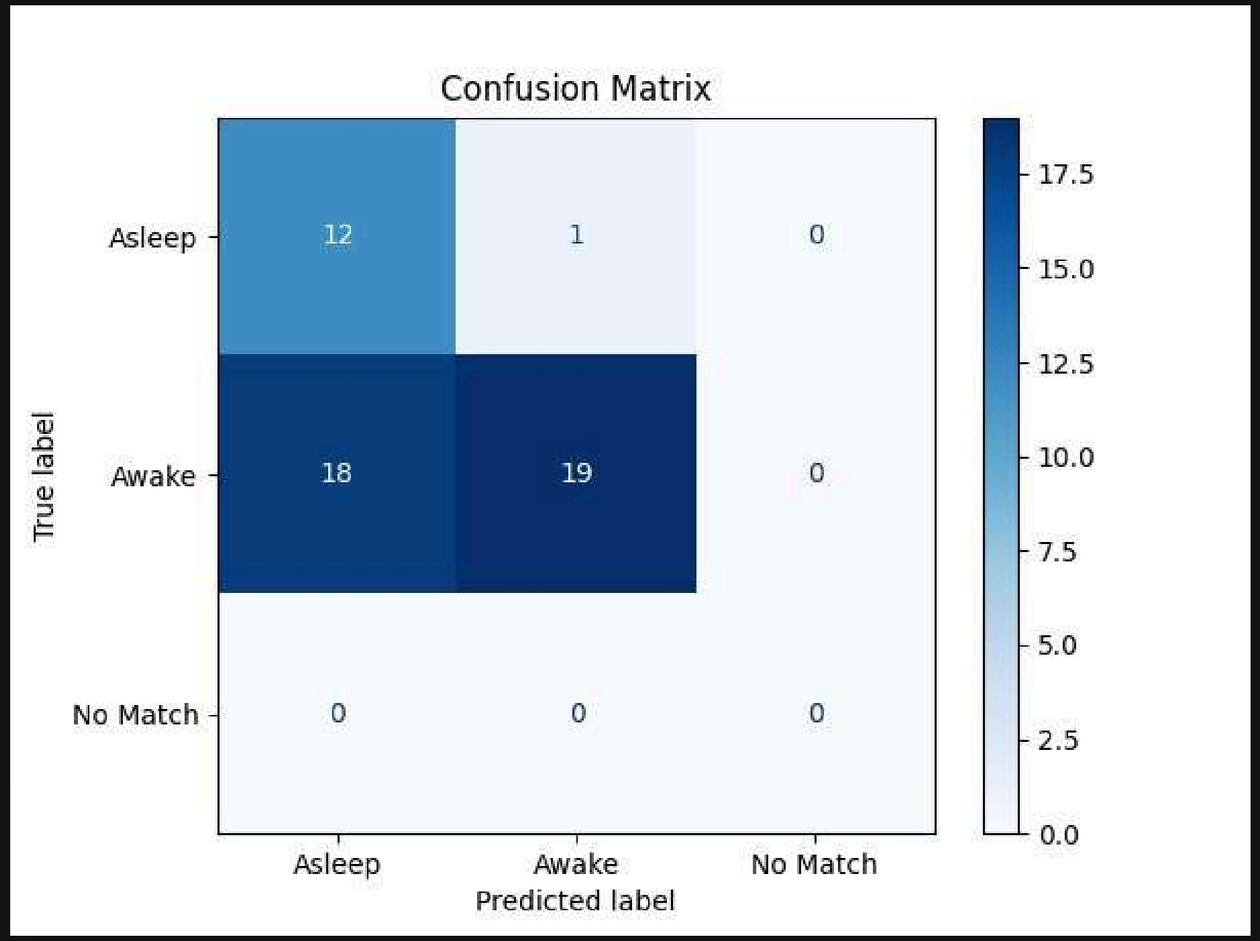


DATA & ANALYSIS

	Precision	Recall	F1-Score	Accuracy
Asleep	55%	87.5%	67.8%	60%
Awake	75%	34.6%	47.4%	
No Match	-	-	-	

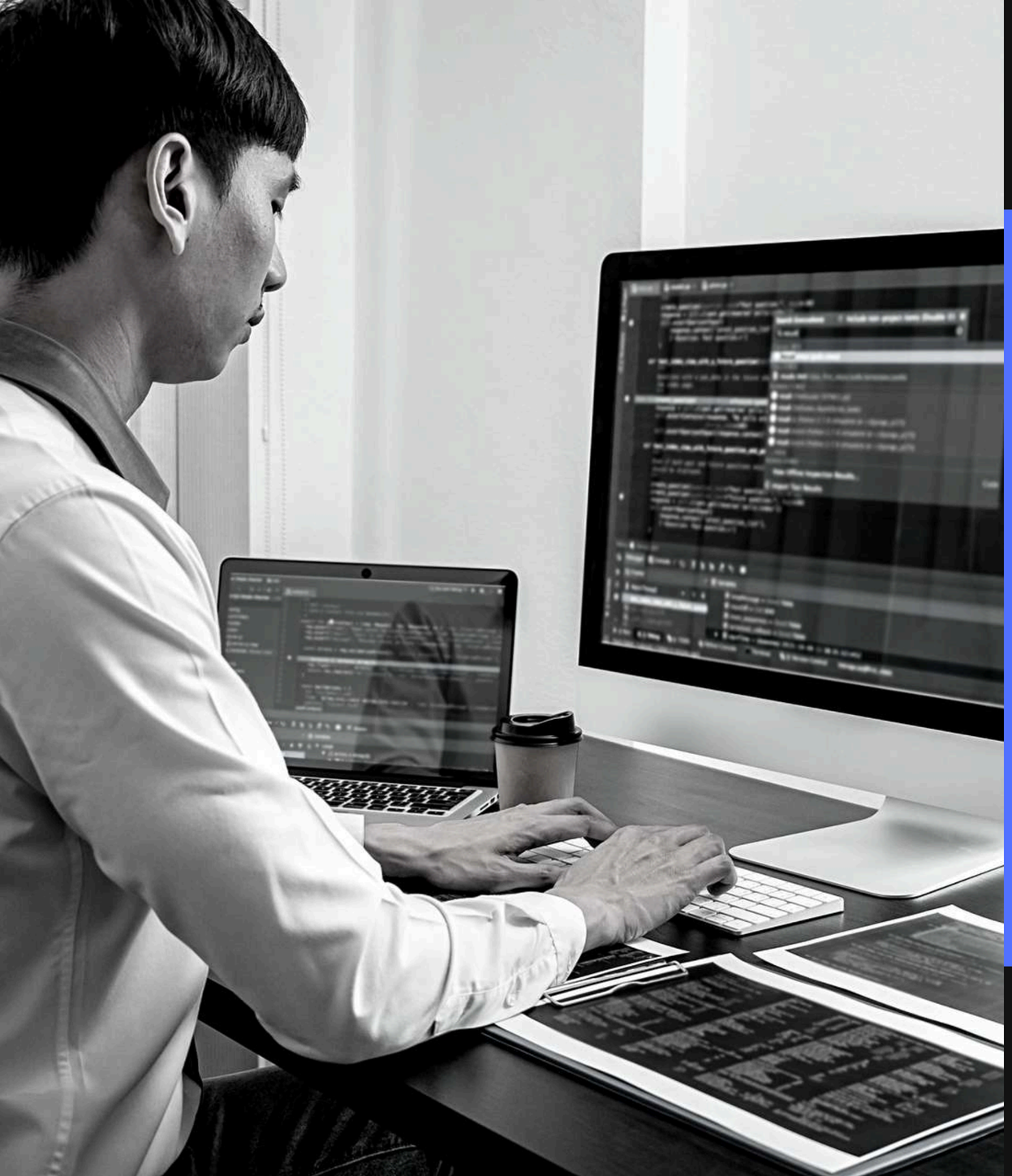
DATA & ANALYSIS

500 Sample Data



DATA & ANALYSIS

	Precision	Recall	F1-Score	Accuracy
Asleep	40%	92.3%	55.8%	62%
Awake	95%	51.4%	66.7%	
No Match	-	-	-	



CONCLUSION

the program can detect sleep and comparing data from 100, 300, and 500 samples:

- A higher number of samples increases the accuracy of detecting sleep behaviours.
- Model's overall accuracy increases from 34% with 100 samples to 62% with 500 samples.

FUTURE WORK

1. Use a laptop/device with a higher RAM capacity, which is at least 16GB
2. Expand the training for the machine learning
3. Increase the number of samples
4. Compress image files to optimize processing time

THANK YOU

PROBES PRESENTATION