

NEUROSYNCG

Project ID: 15006713

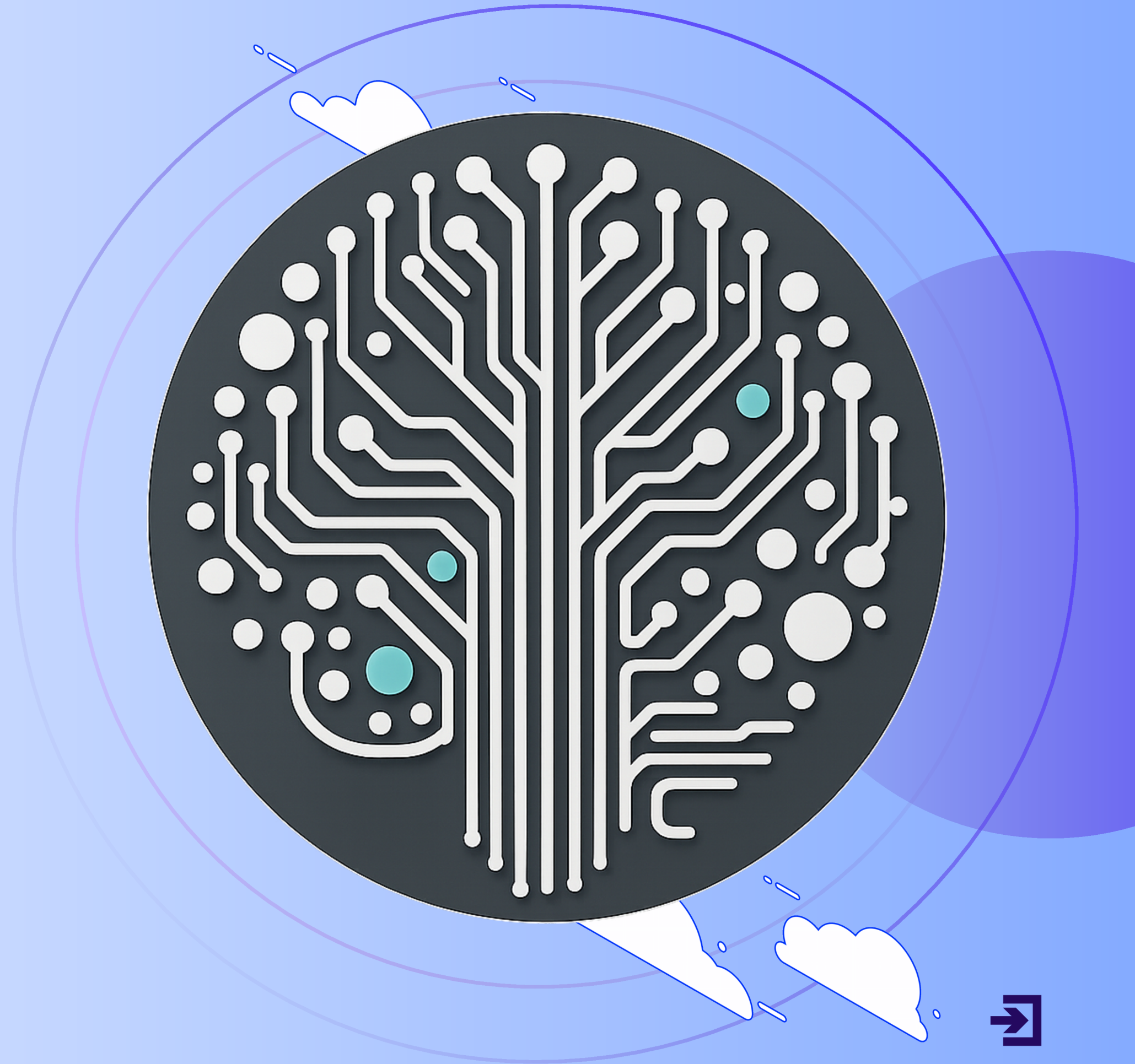
Artificial Intelligence Workshop

Supervised by Dr. Sarel Cohen

Team Members: Lior Kashi, Daniel Shoshan, Or Lerner



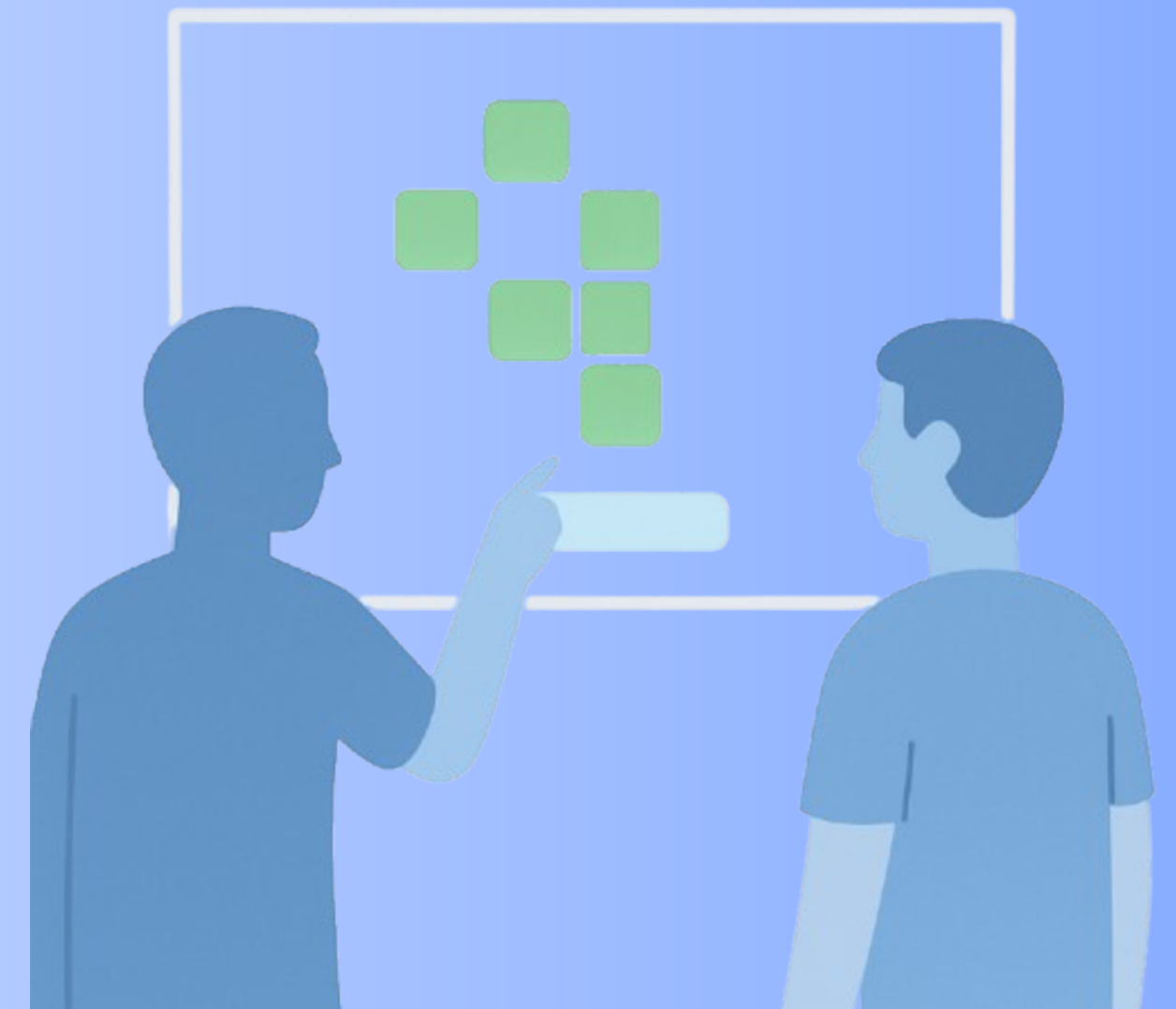
[GitHub Link](#)



PROBLEM DESCRIPTION

THE PROBLEM

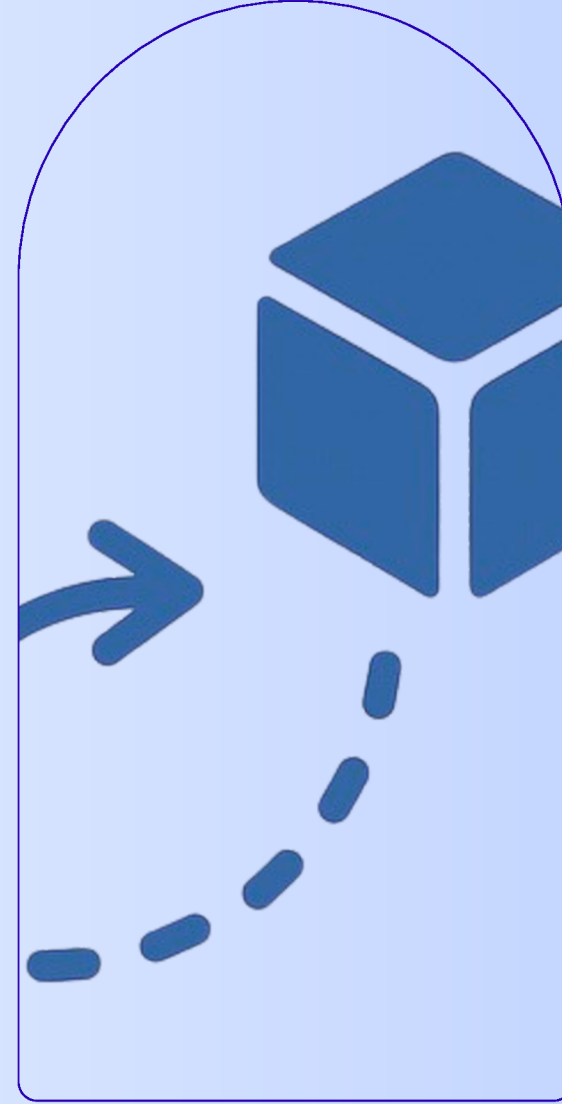
- Researchers in various labs are using a manual system for documentation actions.
- The system also relied on visual analysis and labeling of shapes and participants' behavior.
- This approach was slow, time-consuming, and not always accurate.
- As a result, collecting and analyzing large volumes of behavioral data was challenging.



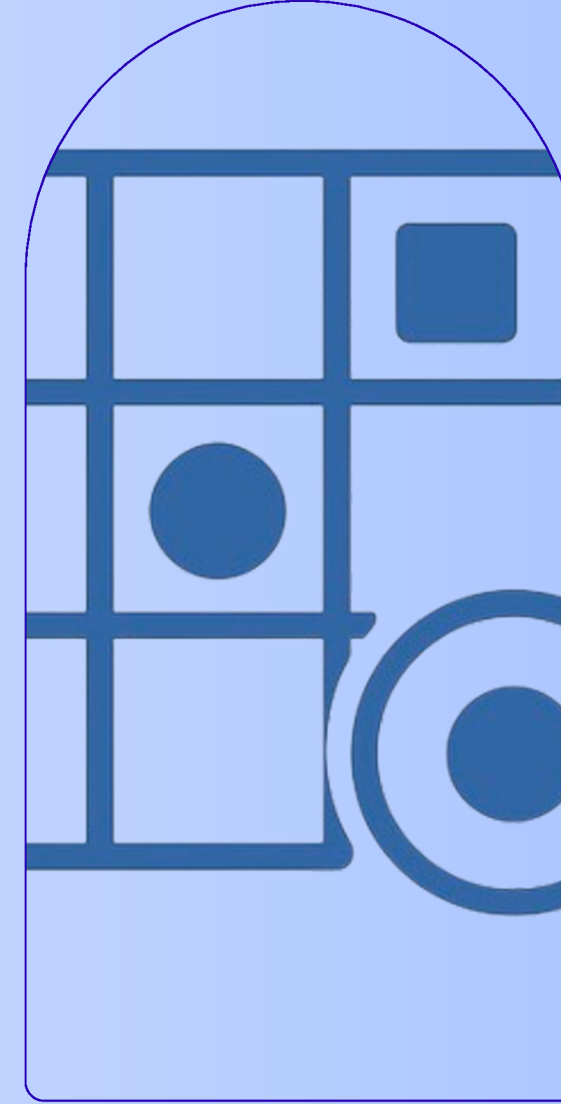
SOLUTION DESCRIPTION



**Upgrading the
Existing Game**



**Tracking Cube
Movement**



**Combining Logs
with Video**



Using a VLM



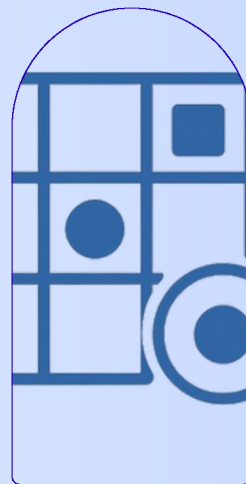
SOLUTION DESCRIPTION



Upgrading the Existing Game



Tracking Cube Movement



Combining Logs with Video



Using a VLM

We added automatic logs that record every in-game action – from the game's start time, through each player's movement, to the end of each turn, including the exact time a shape is saved.



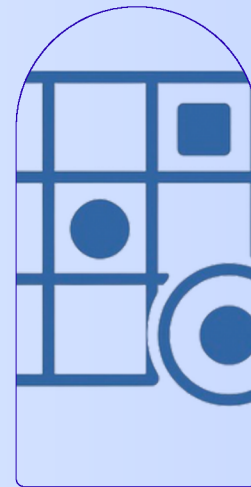
SOLUTION DESCRIPTION



**Tracking Cube
Movement**



**Upgrading the
Existing Game**



**Combining Logs
with Video**

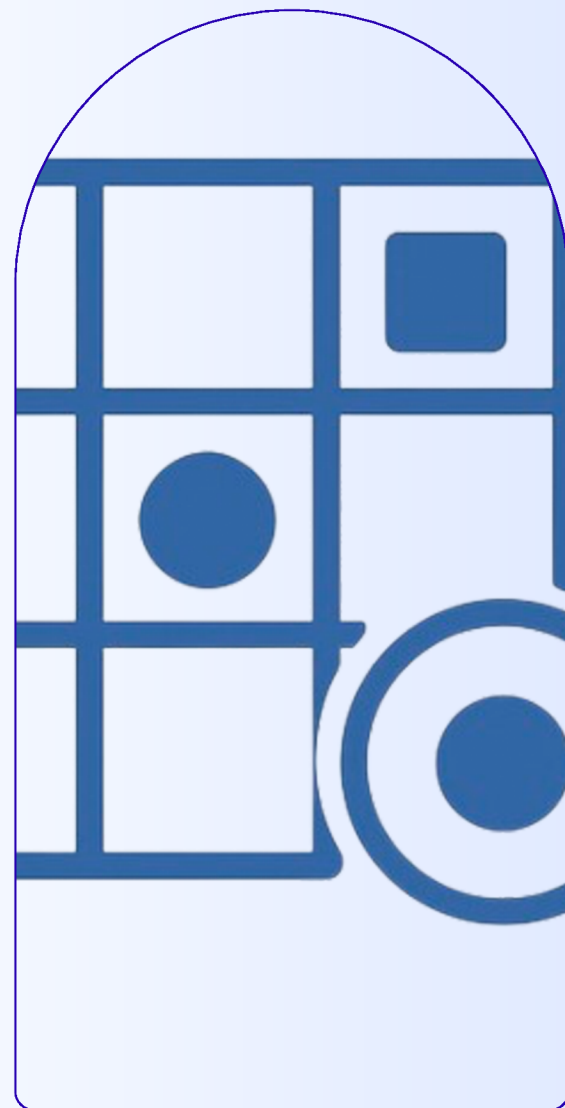


Using a VLM

**Each movement is saved with a timestamp,
including the cube's final position on the board.**



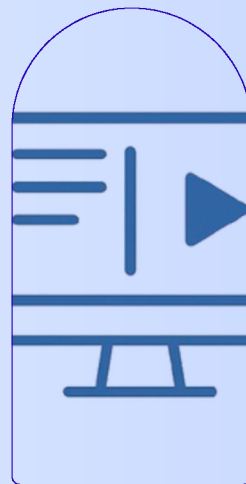
SOLUTION DESCRIPTION



**Combining Logs
with Video**



**Tracking Cube
Movement**



**Upgrading the
Existing Game**



Using a VLM

**Logs are synchronized with video footage to generate accurate insights –
for example, identifying which player is active at any given moment.**



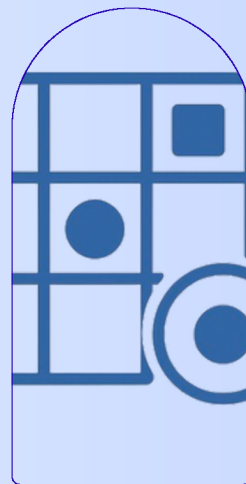
SOLUTION DESCRIPTION



Using a VLM



**Tracking Cube
Movement**



**Combining Logs
with Video**



**Upgrading the
Existing Game**

Integration of a visual-language model from OpenAI (GPT-4) enables joint analysis of images and text for smart action tagging.



DEMO

The video showcases our system in action:

- Automatic player identification.
- Real-time movement tracking via logs.



VIDEO



LOGS

date	type	start_time	end_time	end_position	all_positions	gallery_shape_number
2025-05-27	moveblock	2.113432179	3.788326300	[0.245, -0.07]	[[[-0.315, 0.0], [-0.245, 0.0], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.315, 0.0]]]	nan
2025-05-27	moveblock	4.002665239	7.522333111	[-0.245, -0.07]	[[[-0.315, 0.0], [-0.245, 0.0], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	8.022223331	10.50675832	[-0.175, -0.07]	[[[-0.245, -0.07], [-0.245, 0.0], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	12.16672348	15.43301555	[0.245, -0.07]	[[[-0.175, -0.07], [-0.245, 0.0], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	17.65510000	18.90012221	[-0.175, -0.14]	[[[-0.175, -0.07], [-0.245, 0.0], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	added shape to gallery	19.00112312	nan	nan		1 [[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]
2025-05-27	moveblock	22.33321222	23.99900011	[0.175, -0.07]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	24.22100000	26.11111100	[0.175, -0.14]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.175, -0.07]]]	nan
2025-05-27	moveblock	26.30002222	27.99999911	[0.175, 0.07]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.175, -0.07]]]	nan
2025-05-27	moveblock	30.21000333	32.67779077	[0.175, -0.14]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.175, -0.07]]]	nan
2025-05-27	added shape to gallery	33.38598398	nan	nan		2 [[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.175, -0.14], [0.175, -0.07]]]
2025-05-27	moveblock	35.54443224	36.90904329	[0.105, -0.14]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	39.57576291	42.00027148	[0.175, -0.07]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	moveblock	42.55694302	44.58883928	[0.035, -0.14]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	added shape to gallery	45.77788966	nan	nan		3 [[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.175, -0.14], [0.175, -0.07]]]
2025-05-27	moveblock	47.66632211	48.22211450	[0.105, -0.21]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan
2025-05-27	added shape to gallery	49.00013485	nan	nan		3 [[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.175, -0.14], [0.175, -0.07]]]
2025-05-27	moveblock	51.44521100	53.28939212	[0.175, -0.14]	[[[-0.175, -0.07], [-0.175, -0.14], [-0.175, 0.0], [-0.105, 0.0], [-0.035, 0.0], [0.035, 0.0], [0.105, 0.0], [0.175, 0.0], [0.245, 0.0], [0.245, -0.07]]]	nan



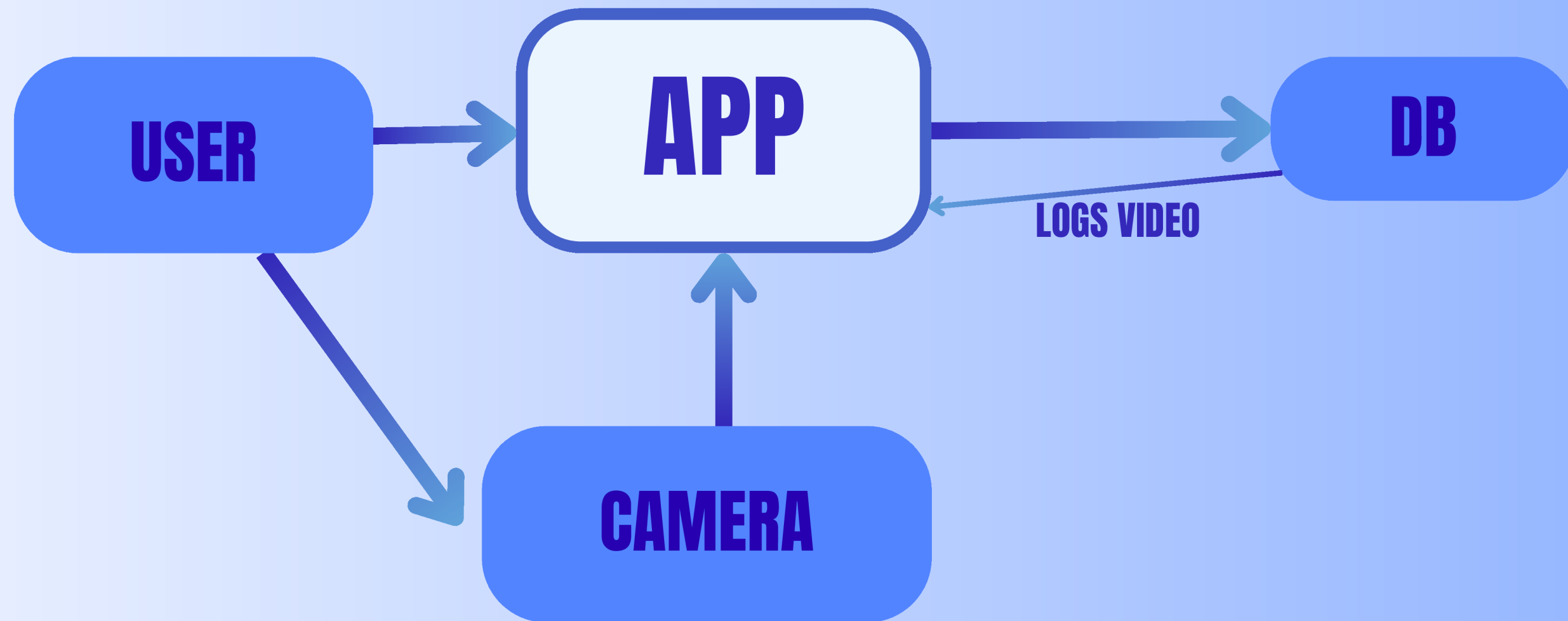
LOGS

	explanation	answer	time_seconds	1
	The person on the left is touching the screen with their hand extended and making contact, while the person on the right is not touchi	left	2.11	2
	The person on the right is touching the screen with their right hand, while the person on the left is not touching the screen.	right	4	3
	The person on the left is touching the screen with their hand extended and making contact, while the person on the right is not touchi	left	8.02	4
	The person on the right is touching the screen, as their hand is extended forward and making contact with it, while the person on the	right	12.16	5
	The person on the left is touching the screen, as their hand is clearly extended and making contact with the screen, while the person	left	17.65	6
	The person on the left is touching the screen with their hand, while the person on the right is standing in front of the screen but not tou	left	19	7
	The person on the right has their hand extended and appears to be touching the screen, while the person on the left has their arms d	right	22.33	8
	The person on the left is touching the screen with their hand, while the person on the right's hand is not in contact with the screen.	left	24.22	9
	The person on the left is touching the screen, as their hand is clearly extended and making contact with the screen, while the person	left	26.3	10
	The person on the right is touching the screen with their right hand, while the person on the left is not touching the screen.	right	30.21	11
	The person on the right is touching the screen with their right hand, while the person on the left is not touching the screen.	right	33.38	12
	The person on the left is touching the screen with their hand extended and making contact, while the person on the right is not touchi	left	35.54	13
	The person on the right is touching the screen with their finger clearly extended towards it.	right	39.57	14
	The person on the right is touching the screen, as their hand is extended forward and making contact with it, while the person on the	right	42.55	15
	The person on the right has their hand extended and appears to be touching the screen, while the person on the left has their arms d	right	45.77	16
	The person on the left is touching the screen, as their hand is clearly extended and making contact with the screen, while the person	left	47.66	17
	The person on the left is touching the screen, as their hand is clearly extended and making contact with the screen, while the person	left	49	18
	The person on the right is touching the screen, as their hand is extended forward and making contact with it, while the person on the	right	51.44	19
	The person on the right has their hand extended and appears to be touching the screen, while the person on the left has their arms d	right	55.44	20
				21



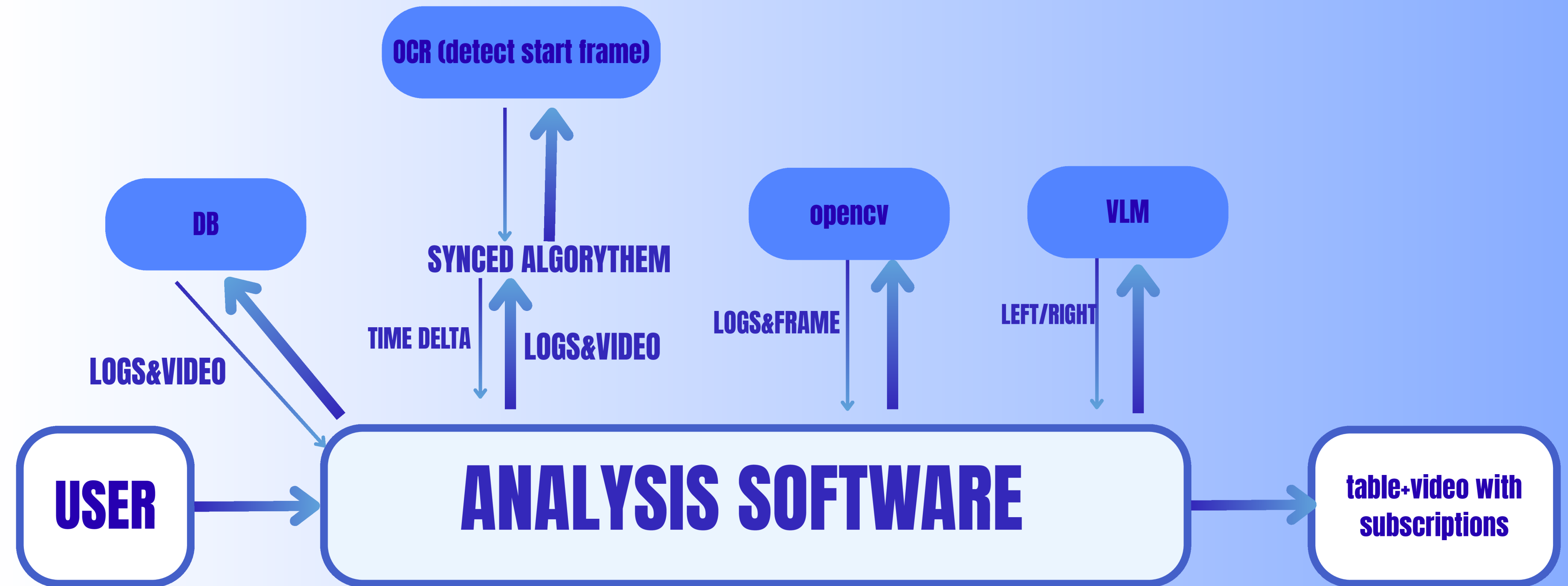
SOLUTION ARCHITECTURE

DURING EXPERIMENT:



SOLUTION ARCHITECTURE

AFTER EXPERIMENT:



SOLUTION ARCHITECTURE

TECHNOLOGIES:



SciPy



PsychoPy



NumPy



**OpenAI
API**



OpenCV

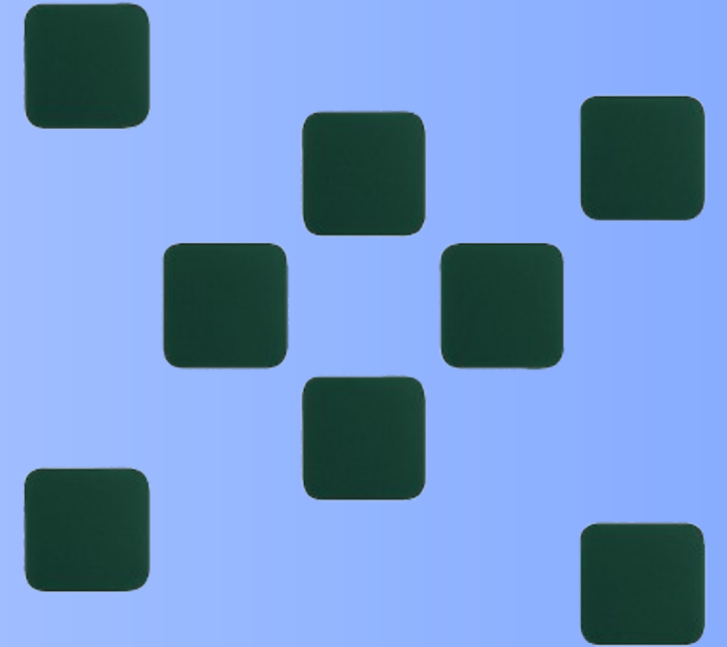


pandas



SOLUTION ARCHITECTURE

DESCRIPTION OF TECHNOLOGIES



Game Engine – Built with Python and PsychoPy for graphic interaction, precise timing and structured logging.

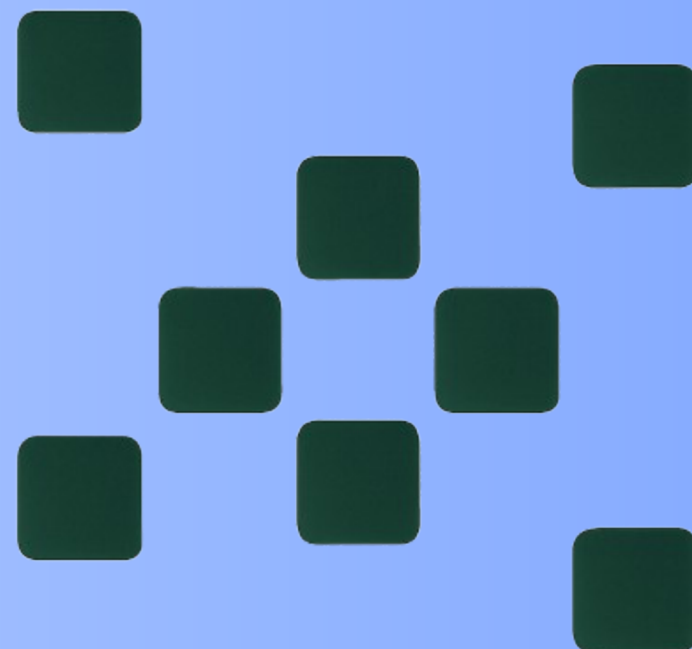
openCV – A well known library for computer vision, we use it mainly to extract frames from the video at giving particular time stamps.

VLM – Uses a vision-language model (GPT-4) to match video frames with player actions.

Sync Module – Aligns video and logs for accurate real-time behavior analysis, including synchronization with OCR-based event detection.



WHAT'S NEXT?

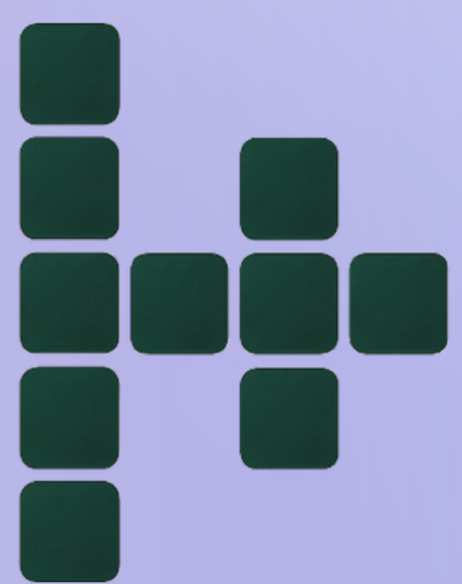


We aim to automate the process of detecting the experiment's starting point:

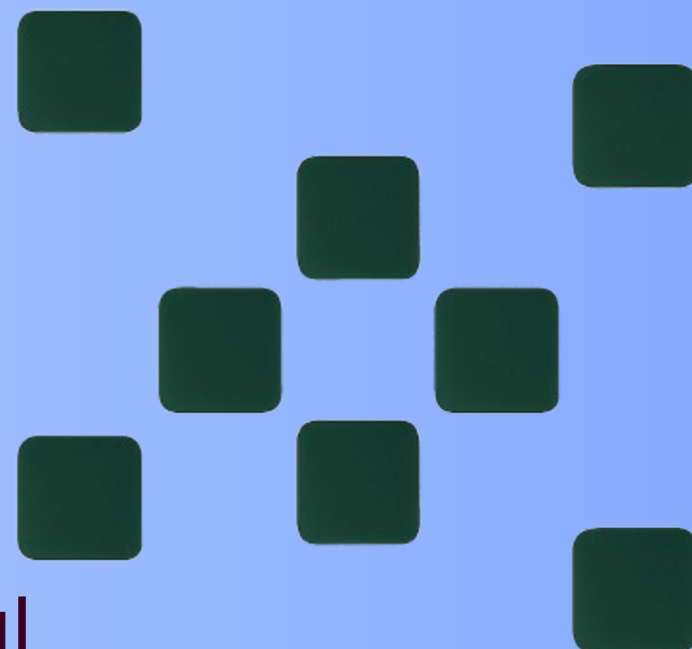
Goal: Automatically identify the game's opening frame — the one showing the start screen.

How: By using OCR (Optical Character Recognition) technology to detect keywords from the opening frame screen.

Outcome: Automatic trimming of the video from the exact moment the experiment begins — with no need for manual intervention.



WHAT'S NEXT?



Goal:

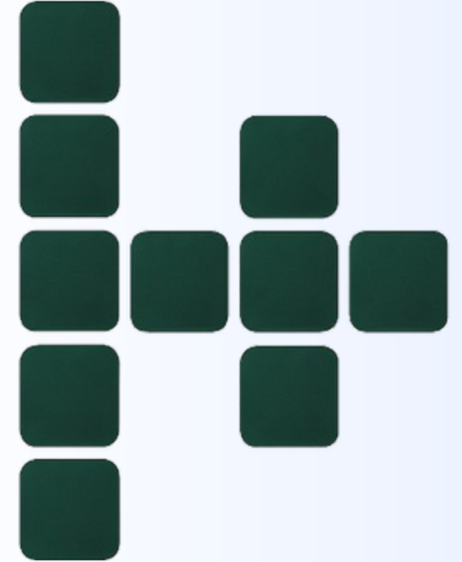
Accurately detect who touched the screen by sampling several frames in window and taking the majority of the decisions.

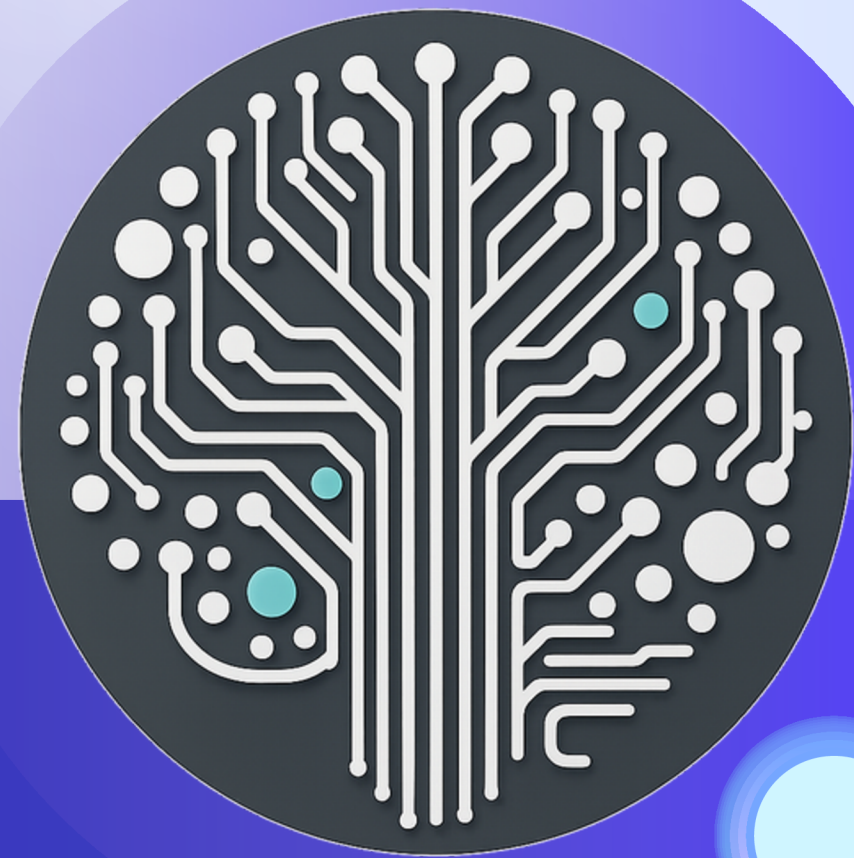
How:

Extract three frames around the touch event, process with OpenCV, and analyze using OpenAI's vision model to select the most reliable result.

Outcome:

Improved accuracy in identifying screen interactions.





THANK YOU!

