**ACTION**

**CODING**

**ENGINE (ACE)**

**Behavior Visualization**

**DATA ANALYTI CS**

🎓Batangas State University – The National Engineering University

This document summarizes all the processed data from the session “**{{Session\_Name}}”** that was analyzed with “**ACTION CODING ENGINE” (ACE)** last **{{Date\_Downloaded }}**. The data presented here is based on the findings and detections of the AI model developed and trained by our research group for the academic year 2024-2025.

Please note that this document does not contain any personal information of students, such as names, grades, or ages. It strictly presents **metrics and visualizations** of student behavior data as detected by the AI. This report is intended for research and analysis purposes only and **must not be used as the sole basis** for evaluating student performance or behavior. The AI system is a tool to assist in understanding behavioral patterns, but human judgment and contextual interpretation remain essential in any assessment.

**Document Details**

Date Downloaded : **{{Date\_Downloaded}}, {{Time\_Downloaded}}**

File Name: **{{File\_Name}}**

Session Name: **“{{Session\_Name}}”**

**PART 1:**

**AI**

**ANALYTICS**

**DATA**

*Powered by: UNO model*

This section uses an action recognition model or our “UNO model” to distinguish actions by the students. It detects and identifies the student’s whole body posture in determining the action. The key actions observed by this model are “Standing”, “Sitting”, “Extending Arms” for both left and right arms, “Facing Forward”, “Facing Sidewards” such as left and right.

Date & Time Processed*:* {{Date\_Downloaded}}, {{Time\_Downloaded}}

**Front Video Details:**

File Directory/Name

{{AI\_Front\_File\_Path}}

File Size

{{AI\_Front\_File\_Size}}

Video Length:

{{AI\_Front\_Video\_Length}}

**Center Video Details:**

File Directory/Name

{{AI\_Center\_File\_Path}}

File Size

{{AI\_Center\_File\_Size}}

Video Length

{{AI\_Center\_Video\_Length}}

**Heatmap Graph Color Key:**

**Peru:** Sitting

**Dark Orange:** Right Arm Extending Sidewards

**Steel Blue:** Right Arm Neutral (Resting)

**Light Sea Green:** Right Arm Unknown

**Tomato Red:** Left Arm Extending Sidewards

**Forest Green:** Left Arm Neutral (Resting)

**Blue Violet:** Left Arm Unknown

**Dark Grey:** Standing

**Medium Orchid:** Facing Right

**Hot Pink:** Facing Left

**Dark Turquoise:** Facing Forward

**Bright Yellow:** Facing Downwards

**HEATMAP VISUALIZATIONS**

The following diagrams showcase heatmap visualizations generated at different time intervals—specifically at 25%, 50%, 75%, and 100% of the processed video footage. These heatmaps represent the frequency and spatial distribution of detected actions as the examination progresses, providing insight into how student behaviors evolve over time. Additionally, separate heatmaps highlight specific actions such as sitting, standing, and arm movements.

{{Heatmap\_All\_Actions\_AI\_Analytics\_25}}

*Diagram 1.1 25% Heatmap for All Actions*

Diagram 1.1 displays the heatmap visualization of all detected actions within the first 25% of the video duration. The highlighted areas in the heatmap indicate zones with the highest concentration of movements or activities, offering an early glimpse into student behavior patterns.

{{Heatmap\_All\_Actions\_AI\_Analytics\_50}}

*Diagram 1.2 50% Heatmap for All Actions*

Diagram 1.2 presents the heatmap visualization of all detected actions up to 50% of the video duration. The data in the heatmap reflects the evolving distribution of activity, highlighting any noticeable shifts or increases in student movements as the examination progresses.

{{Heatmap\_All\_Actions\_AI\_Analytics\_75}}

*Diagram 1.3 75% Heatmap for All Actions*

Diagram 1.3 presents the heatmap visualization of all detected actions up to 75% of the video duration. The data in the heatmap shows how activity patterns continue to develop, potentially indicating increased movement or behavioral shifts nearing the later stages of the examination.

{{Heatmap\_All\_Actions\_AI\_Analytics\_100}}

*Diagram 1.4 100% Heatmap for All Actions*

Diagram 1.4 displays the complete heatmap of all detected actions throughout the entire video duration. The visualization in the heatmap offers a comprehensive overview of all student movements, revealing the most frequently active areas within the classroom during the full exam period.

{{Heatmap\_All\_Actions\_AI}}

*Diagram 1.5 Heatmap for All Actions*

Diagram 1.5 shows the overall heatmap for all detected actions throughout the entire video duration. The data in the heatmap provides a general overview of student activity and frequently occupied areas in the classroom.

{{Heatmap\_Sitting\_Actions\_AI}}

*Diagram 1.6 Heatmap for Sitting Actions Only*

Diagram 1.6 presents the heatmap focused exclusively on sitting actions. The patterns in the heatmap highlight where sitting behavior was most consistently detected during the examination.

{{Heatmap\_ExtendingRight\_Actions\_AI}}  
*Diagram 1.7 Heatmap for Extending Right Arm Actions Only*

Diagram 1.7 displays the heatmap for extending the right arm actions only. The data in the heatmap reveals the spatial distribution of these specific movements, which may indicate behaviors of extending right arms.

{{Heatmap\_RightArmResting\_Actions\_AI}}  
*Diagram 1.8 Heatmap for Right Arm Neutral (Resting) Actions Only*

Diagram 1.8 shows the heatmap visualization for right arm neutral (resting) actions only. The data in the heatmap identifies areas where students were observed keeping their right arm in a resting or inactive position throughout the exam.

{{Heatmap\_RightArmUnknown\_Actions\_AI}}  
*Diagram 1.9 Heatmap for Right Arm Unknown Actions Only*

Diagram 1.9 presents the heatmap for right arm unknown actions only. The heatmap highlights spatial patterns where the model could not confidently classify the right arm's movement, indicating ambiguous or indistinct behavior.

{{Heatmap\_ExtendingLeft\_Actions\_AI}} *Diagram 1.10 Heatmap for Extending Left Arm Actions Only*

Diagram 1.10 shows the heatmap for extending the left arm actions only. The highlighted regions in the heatmap suggest instances where left-side activity occurred, potentially pointing to left arm actions or interactions.

{{Heatmap\_LeftArmResting\_Actions\_AI}}  
*Diagram 1.11 Heatmap for Left Arm Neutral (Resting) Actions Only*

Diagram 1.11 presents the heatmap visualization for left arm neutral (resting) actions only. The data in the heatmap indicates where students were observed keeping their left arm in a stationary or relaxed position during the examination.

{{Heatmap\_LeftArmUnknown\_Actions\_AI}}  
*Diagram 1.12 Heatmap for Left Arm Unknown Actions Only*

Diagram 1.12 shows the heatmap for left arm unknown actions only. The visualization in the heatmap highlights locations where the model was unable to clearly classify the movement of the left arm, suggesting uncertain or indistinct actions.

{{Heatmap\_Standing\_Actions\_AI}}  
*Diagram 1.13 Heatmap for Standing Actions Only*

Diagram 1.13 presents the heatmap for standing actions only. The data in the heatmap helps identify areas where students stood up during the exam.

{{Heatmap\_FacingRight\_Actions\_AI}}  
*Diagram 1.14 Heatmap fo Facing Right Actions Only*

Diagram 1.14 shows the heatmap for facing right actions only. The data in the heatmap highlights locations where students were observed facing towards the right during the examination.

{{Heatmap\_FacingLeft\_Actions\_AI}}  
*Diagram 1.15 Heatmap fo Facing Left Actions Only*

Diagram 1.15 presents the heatmap for facing left actions only. The visualization in the heatmap reveals areas where students were seen facing towards the left, indicating specific movement or attention patterns.

{{Heatmap\_FacingForward\_Actions\_AI}}  
*Diagram 1.16 Heatmap fo Facing Forward Actions Only*

Diagram 1.16 displays the heatmap for facing forward actions only. The data in the heatmap marks areas where students were observed facing forward, suggesting more focused or neutral positions during the exam.

{{Heatmap\_FacingDownwards\_Actions\_AI}}  
*Diagram 1.17 Heatmap fo Facing Downwards Actions Only*

Diagram 1.17 presents the heatmap for facing downwards actions only. The heatmap highlights zones where students were observed looking downward, possibly indicating reading, writing, or other focused activities.

**Line Graph Color Key:**

**Peru:** Sitting

**Dark Orange:** Right Arm Extending Sidewards

**Steel Blue:** Right Arm Neutral (Resting)

**Light Sea Green:** Right Arm Unknown

**Tomato Red:** Left Arm Extending Sidewards

**Forest Green:** Left Arm Neutral (Resting)

**Blue Violet:** Left Arm Unknown

**Dark Grey:** Standing

**Medium Orchid:** Facing Right

**Hot Pink:** Facing Left

**Dark Turquoise:** Facing Forward

**Bright Yellow:** Facing Downwards

{{LineGraph\_All\_Actions\_AI}}  
*Diagram 2.1 Line Graph for All Actions*

Diagram 2.1 presents the line graph showing the trend of all detected actions throughout the video duration. The data in the graph provides insights into how student movements evolve over time.

{{LineGraph\_Sitting\_Actions\_AI}}  
*Diagram 2.2 Line Graph for Sitting Actions Only*

Diagram 2.2 shows the line graph for sitting actions only. This visualizes how often and consistently students remain seated during the examination.

{{LineGraph\_ExtendingRight\_Actions\_AI}}  
*Diagram 2.3 Line Graph for Extending Right Arm Actions Only*

Diagram 2.3 displays the line graph for right arm extension actions. It highlights moments when students extended their right arm, possibly indicating writing or reaching movements.

{{LineGraph\_RightArmResting\_Actions\_AI}}  
*Diagram 2.4 Line Graph for Right Arm Neutral (Resting) Actions Only*

Diagram 2.4 illustrates the frequency of right arm neutral (resting) actions over time. It reflects moments of low activity or rest involving the right arm.

{{LineGraph\_RightArmUnknown\_Actions\_AI}}  
*Diagram 2.5 Line Graph for Right Arm Unknown Actions Only*

Diagram 2.5 provides a trend of right arm actions that could not be confidently classified. The fluctuations may suggest ambiguous or mixed movements captured by the system.

{{LineGraph\_ExtendingLeft\_Actions\_AI}}  
*Diagram 2.6 Line Graph for Extending Left Arm Actions Only*

Diagram 2.6 shows the temporal distribution of left arm extension actions. This can be indicative of note-taking, reaching, or signaling behavior.

{{LineGraph\_LeftArmResting\_Actions\_AI}}  
*Diagram 2.7 Line Graph for Left Arm Neutral (Resting) Actions Only*

Diagram 2.7 displays how frequently the left arm remained in a neutral or resting position. The data suggests times when students were stationary or not engaged in arm-related activity.

{{LineGraph\_LeftArmUnknown\_Actions\_AI}}  
*Diagram 2.8 Line Graph for Left Arm Unknown Actions Only*

Diagram 2.8 visualizes unclassified left arm movements. The graph points to actions that were not clearly labeled, possibly due to occlusion or unclear posture.

{{LineGraph\_Standing\_Actions\_AI}}  
*Diagram 2.9 Line Graph for Standing Actions Only*

Diagram 2.9 presents the number of standing actions recorded during the exam. Peaks in the graph may indicate restroom breaks, submission events, or unusual movement.

{{LineGraph\_Facing\_Right\_AI}}  
*Diagram 2.10 Line Graph for Facing Right Only*

Diagram 2.10 shows the frequency of students facing to the right. These directional head movements may hint at distractions or communication attempts.

{{LineGraph\_Facing\_Left\_AI}}  
*Diagram 2.11 Line Graph for Facing Left Only*

Diagram 2.11 illustrates leftward head orientation patterns over time. It captures how often students looked to their left, potentially reflecting engagement or off-task behavior.

{{LineGraph\_Facing\_Forward\_AI}}  
*Diagram 2.12 Line Graph for Facing Forward Only*

Diagram 2.12 provides a view of how often students were facing forward. A high consistency in this action may correlate with focus on the examination.

{{LineGraph\_Facing\_Downward\_AI}}  
*Diagram 2.13 Line Graph for Facing Downward Only*

Diagram 2.13 reveals the instances where students faced downward. This could indicate reading, writing, or disengagement depending on context.

**Conclusion:**

The AI Analytics Data powered by the UNO model provides a comprehensive summary of student behaviors during an examination by analyzing video footage from both front and center camera angles. Key video details such as file names, sizes, creation dates, and durations are documented to ensure traceability. Heatmap visualizations and line graphs illustrate the frequency and distribution of specific actions—such as sitting, standing, arm movements, and head orientation—at various intervals (25%, 50%, 75%, and 100%) throughout the exam. Each action is color-coded to provide a clear, intuitive understanding of behavioral patterns. Heatmaps offer spatial insights by showing where actions most frequently occurred in the classroom, while line graphs depict how these behaviors evolved over time. Sitting remained the most consistent action, suggesting general compliance with examination protocols, while fluctuations in arm movements and head directions could indicate engagement, distraction, or potential misconduct. This data-driven approach enables educators to monitor and assess student behavior more efficiently, providing a reliable visual and statistical overview of classroom activity during examinations.

### 

**PART 1:**

**ADVANCED**

**ANALYTICS DATA**

Date & Time Processed*:* {{Date\_Downloaded}}, {{Time\_Downloaded}}

File Directory/Name

{{AI\_Front\_File\_Path}}

File Size

{{AI\_Front\_File\_Size}}

Video Length:

{{AI\_Front\_Video\_Length}}

**Center Video Details:**

File Directory/Name

{{AI\_Center\_File\_Path}}

File Size

{{AI\_Center\_File\_Size}}

Video Length

{{AI\_Center\_Video\_Length}}

#### **Head Movement Analysis (Line Graph & Data Summary)**

**Line Graph Color Key:**

**Medium Orchid:** Facing Right

**Hot Pink:** Facing Left

**Dark Turquoise:** Facing Forward

**Bright Yellow:** Facing Downwards

**- - - Dash Line:** Total Students

{{LineGraph\_HeadMovement\_Analysis}}

*Diagram 1.1 Number of Students per Head Movement Over Time*

Diagram 1.1 shows the number of students displaying various head movements over time. The line graph captures patterns such as facing forward, downward, left, or right, helping to analyze attention direction and potential distractions during the examination.

**Description:**

Total number of students detected

{{Head\_Total\_Students}}

**Top 4 time frames with highest head movement actions:**

At **{{Head\_Time}}**, **{{Number\_of\_Students\_Right}} students** facing right (>90 degrees)

At **{{Head\_Time}}**, **{{Number\_of\_Students\_Left}} students** facing left (<80 degrees)

At **{{Head\_Time}}**, **{{Number\_of\_Students\_Down}} students** facing downwards

At **{{Head\_Time}}**, **{{Number\_of\_Students\_Down}} students** facing forward

#### **Arm Movement Analysis (Line Graph & Data Summary)**

**Line Graph Color Key:**

**Dark Orange:** Right Arm Extending Sidewards

**Steel Blue:** Right Arm Neutral (Resting)

**Light Sea Green:** Right Arm Unknown

**Tomato Red:** Left Arm Extending Sidewards

**Forest Green:** Left Arm Neutral (Resting)

**Blue Violet:** Left Arm Unknown

**- - - Dash Line:** Total Students

{{LineGraph\_ArmMovement\_Analysis}}

*Diagram 1.2 Number of Students per Arm Movement Over Time*

Diagram 1.2 illustrates the number of students exhibiting different types of arm movements over time. The line graph highlights trends in movement patterns, such as extending, resting, or unknown arm positions, offering insights into physical engagement levels during the exam.

**Description:**

Total number of students detected

{{Arm\_Total\_Students}}

**Top 3 time frames with highest arm movement actions:**

At **{{Arm\_Time}}**, **{{Number\_of\_Students\_Extended}} students** extended their arms

At **{{Arm\_Time}}**, **{{Number\_of\_Students\_RestingArms}} students** resting their arms

At **{{Arm\_Time}}**, **{{Number\_of\_Students\_ArmUnknown}} students** are detected their arms movement as unknown.

**Heatmap Graph Color Key:**

**Peru:** Sitting

**Dark Orange:** Right Arm Extending Sidewards

**Steel Blue:** Right Arm Neutral (Resting)

**Light Sea Green:** Right Arm Unknown

**Tomato Red:** Left Arm Extending Sidewards

**Forest Green:** Left Arm Neutral (Resting)

**Blue Violet:** Left Arm Unknown

**Dark Grey:** Standing

**Medium Orchid:** Facing Right

**Hot Pink:** Facing Left

**Dark Turquoise:** Facing Forward

**Bright Yellow:** Facing Downwards

**HEATMAP VISUALIZATION**

The following heatmaps show where and how often student actions were detected at different points in time specifically at 25%, 50%, 75%, and 100% of the video footage. These visualizations help track how student behavior changes as the exam goes on. Separate heatmaps are also included to show specific actions like sitting, standing, and moving arms.

{{Heatmap\_All\_Actions\_Advanced\_Analytics\_25}}

*Diagram 1.3 25% Heatmap for All Actions*

Diagram 1.5 presents the heatmap visualization from the advanced analytics model, capturing all detected actions within the first 25% of the video duration. The data in the heatmap highlights the initial distribution of movements, helping identify early activity zones in the classroom.

{{Heatmap\_All\_Actions\_Advanced\_Analytics\_50}}

*Diagram 1.4 50% Heatmap for All Actions*

Diagram 1.6 shows the advanced analytics heatmap up to 50% of the video duration. The visualization in the heatmap reflects the mid-examination behavior patterns and potential changes in activity compared to the initial phase.

{{Heatmap\_All\_Actions\_Advanced\_Analytics\_75}}

*Diagram 1.5 75% Heatmap for All Actions*

Diagram 1.7 displays the advanced analytics heatmap at 75% of the video. The data in the heatmap helps visualize how student actions evolve as the exam approaches its final quarter, possibly indicating increased activity.

{{Heatmap\_All\_Actions\_Advanced\_Analytics\_100}}

*Diagram 1.6 100% Heatmap for All Actions*

Diagram 1.8 presents the complete heatmap using advanced analytics across 100% of the video duration. The visualization in the heatmap provides a full summary of student movements throughout the entire examination period.

{{Heatmap\_All\_Actions\_Advanced}}

*Diagram 1.7 Heatmap for All Actions*

Diagram 1.7 presents the heatmap for all detected actions using advanced analytics. The data in the heatmap provides a detailed overview of student activity across the entire examination period, focusing on spatial activity patterns.

{{Heatmap\_Sitting\_Actions\_Advanced}}

*Diagram 1.8 Heatmap for Sitting Actions Only*

Diagram 1.8 shows the heatmap for sitting actions only, utilizing advanced analytics. The heatmap highlights areas where sitting behavior was most frequently observed, helping to identify student focus or inactivity during the examination.

{{Heatmap\_ExtendingRight\_Actions\_Advanced}}  
*Diagram 1.9 Heatmap for Extending Right Arm Actions Only*

Diagram 1.9 displays the heatmap for extending the right arm actions only, based on advanced analytics. The data in the heatmap visualizes where students engaged in right arm movements, possibly indicating writing, reaching, or other similar actions.

{{Heatmap\_RightArmResting\_Actions\_Advanced}}  
*Diagram 1.10 Heatmap for Right Arm Neutral (Resting) Actions Only*

Diagram 1.10 presents the heatmap for right arm neutral (resting) actions only. The heatmap reveals locations where students kept their right arm in a neutral or resting position during the exam, providing insight into periods of inactivity.

{{Heatmap\_RightArmUnknown\_Actions\_Advanced}}  
*Diagram 1.11 Heatmap for Right Arm Unknown Actions Only*

Diagram 1.11 shows the heatmap for right arm unknown actions only. This heatmap visualizes zones where the model could not categorize the right arm’s movement, indicating uncertain or ambiguous actions.

{{Heatmap\_ExtendingLeft\_Actions\_Advanced}}  
*Diagram 1.12 Heatmap for Extending Left Arm Actions Only*

Diagram 1.12 presents the heatmap for extending the left arm actions only. The data in the heatmap highlights locations where left arm movements were detected, which could suggest similar actions like writing or reaching, but with the left hand.

{{Heatmap\_LeftArmResting\_Actions\_AdvancedI}}  
*Diagram 1.13 Heatmap for Left Arm Neutral (Resting) Actions Only*

Diagram 1.13 displays the heatmap for left arm neutral (resting) actions only. The heatmap indicates areas where students rested their left arm, providing information about periods of stillness during the examination.

{{Heatmap\_LeftArmUnknown\_Actions\_Advanced}}  
*Diagram 1.14 Heatmap for Left Arm Unknown Actions Only*

Diagram 1.14 shows the heatmap for left arm unknown actions only. This heatmap highlights locations where the left arm’s movement was ambiguous, providing insights into moments where the model had difficulty categorizing the behavior.

{{Heatmap\_Standing\_Actions\_Advanced}}  
*Diagram 1.15 Heatmap for Standing Actions Only*

Diagram 1.15 presents the heatmap for standing actions only. The data in the heatmap visualizes where students stood up during the examination.

{{Heatmap\_Facing\_Right\_Advanced}}  
*Diagram 1.16 Heatmap for Facing Right Only*

Diagram 1.16 displays the heatmap for facing right actions only. The heatmap marks areas where students were observed facing to the right, which could indicate shifts in attention or movement during the exam.

{{Heatmap\_Facing\_Left\_Advanced}} *Diagram 1.17 Heatmap for Facing Left Only*

Diagram 1.17 presents the heatmap for facing left actions only. This heatmap highlights areas where students were seen facing left, providing information on how they shifted their attention or position during the exam.

{{Heatmap\_Facing\_Forward\_Advanced}} *Diagram 1.18 Heatmap for Facing Forward Only*

Diagram 1.18 shows the heatmap for facing forward actions only. The data in the heatmap visualizes where students were facing forward, potentially indicating more neutral positions or focused attention.

{{Heatmap\_Facing\_Downward\_Advanced}}  
*Diagram 1.19 Heatmap for Facing Downward Only*

Diagram 1.19 displays the heatmap for facing downward actions only. The heatmap highlights areas where students were observed looking down, likely indicating reading, writing, or focused engagement with materials.

**Line Graph Color Key:**

**Peru:** Sitting

**Dark Orange:** Right Arm Extending Sidewards

**Steel Blue:** Right Arm Neutral (Resting)

**Light Sea Green:** Right Arm Unknown

**Tomato Red:** Left Arm Extending Sidewards

**Forest Green:** Left Arm Neutral (Resting)

**Blue Violet:** Left Arm Unknown

**Dark Grey:** Standing

**Medium Orchid:** Facing Right

**Hot Pink:** Facing Left

**Dark Turquoise:** Facing Forward

**Bright Yellow:** Facing Downwards

{{LineGraph\_All\_Actions\_Advanced}}  
*Diagram 2.1 Line Graph for All Actions*

Diagram 2.1 displays the line graph for all actions using advanced analytics. This graph shows the trend of student movements throughout the examination period, providing insights into the overall activity levels at each time point.

{{LineGraph\_Sitting\_Actions\_Advanced }}  
*Diagram 2.2 Line Graph for Sitting Actions Only*

Diagram 2.2 presents the line graph for sitting actions only. The graph visualizes the frequency and duration of sitting actions, revealing patterns of stillness or minimal movement throughout the exam.

{{LineGraph\_ExtendingRight\_Actions\_Advanced}}  
*Diagram 2.3 Line Graph for Extending Right Arm Actions Only*

Diagram 2.3 shows the line graph for extending right arm actions only. The graph illustrates the occurrence of right arm movements over time, indicating how often students engaged in actions like reaching or writing.

{{LineGraph\_RightArmResting\_Actions\_Advanced}}  
*Diagram 2.4 Line Graph for Right Arm Neutral (Resting) Actions Only*

Diagram 2.4 displays the line graph for right arm neutral (resting) actions only. This line graph highlights the periods when students kept their right arm stationary or relaxed, offering insights into moments of inactivity.

{{LineGraph\_RightArmUnknown\_Actions\_Advanced}}  
*Diagram 2.5 Line Graph for Right Arm Unknown Actions Only*

Diagram 2.5 presents the line graph for right arm unknown actions only. The graph tracks moments when the model could not definitively categorize the movement of the right arm, suggesting uncertain or ambiguous actions.

{{LineGraph\_ExtendingLeft\_Actions\_Advanced}}  
*Diagram 2.6 Line Graph for Extending Left Arm Actions Only*

Diagram 2.6 displays the line graph for extending left arm actions only. The graph highlights when students extended their left arm, showing the frequency of movements like reaching or writing with the left hand.

{{LineGraph\_LeftArmResting\_Actions\_Advanced}}  
*Diagram 2.7 Line Graph for Left Arm Neutral (Resting) Actions Only*

Diagram 2.7 shows the line graph for left arm neutral (resting) actions only. This line graph visualizes when students rested their left arm, indicating periods of inactivity or stillness.

{{LineGraph\_LeftArmUnknown\_Actions\_Advanced}}  
*Diagram 2.8 Line Graph for Left Arm Unknown Actions Only*

Diagram 2.8 presents the line graph for left arm unknown actions only. The graph tracks when the model was unable to classify the left arm movement, providing insights into moments of uncertain behavior.

{{LineGraph\_Standing\_Actions\_Advanced}}  
*Diagram 2.9 Line Graph for Standing Actions Only*

Diagram 2.9 displays the line graph for standing actions only. This graph highlights the frequency of students standing during the examination.

{{LineGraph\_Facing\_Right\_Advanced}}  
*Diagram 2.10 Line Graph for Facing Right Only*

Diagram 2.10 shows the line graph for facing right actions only. The graph tracks how often students were observed facing to the right, revealing shifts in their attention or body position during the exam.

{{LineGraph\_Facing\_Left\_Advanced}}  
*Diagram 2.11 Line Graph for Facing Left Only*

Diagram 2.11 presents the line graph for facing left actions only. This graph illustrates how often students faced left, indicating moments of attention shift or movement during the exam.

{{LineGraph\_Facing\_Forward\_Advanced}}  
*Diagram 2.12 Line Graph for Facing Forward Only*

Diagram 2.12 displays the line graph for facing forward actions only. The graph shows when students were facing forward, suggesting more neutral positions or moments of focused engagement.

{{LineGraph\_Facing\_Downward\_Advanced}}  
*Diagram 2.13 Line Graph for Facing Downward Only*

Diagram 2.13 shows the line graph for facing downward actions only. This line graph visualizes how often students faced downwards, indicating periods of engagement with materials like reading or writing.

**AI ANALYTICS EVENT LOGS SUMMARY**

**Interval:**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Start Time | End Time | Action Summary |
| {% for chunk in AI\_Analytics\_Chunk\_Summary\_Log %} {{ loop.index }} | {{ chunk.time\_range }} | | {{ chunk.summary }} |
| {% endfor %} |  | |  |

**ADVANCED ANALYTICS EVENT LOGS SUMMARY**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Start Time | End Time | Action Summary |
| {% for chunk in Advanced\_Analytics\_Chunk\_Summary\_Log %} {{ loop.index }} | {{ chunk.time\_range }} | | {{ chunk.summary }} |
| {% endfor %} |  | |  |

**Conclusion:**

This report presents the Advanced Analytics Data for the session titled {{Title\_Advanced}}, held under the session name {{Advanced\_Session\_Name}}, and processed on {{Advanced\_Date\_Processed}} at {{Advanced\_Time\_Processed}} by {{Advanced\_Instructor\_Name}}. The front video used for this analysis is located at {{Advanced\_Front\_File\_Path}}, with a filename of {{Advanced\_Front\_File\_Name}}, a file size of {{Advanced\_Front\_File\_Size}}, created on {{Advanced\_Front\_Created\_Date}}, and has a video length of {{Advanced\_Front\_Video\_Length}}. Similarly, the center video is stored at {{Advanced\_Center\_File\_Path}}, named {{Advanced\_Center\_File\_Name}}, with a file size of {{Advanced\_Center\_File\_Size}}, created on {{Advanced\_Center\_Created\_Date}}, and a total length of {{Advanced\_Center\_Video\_Length}}.

The head movement analysis, illustrated in Diagram 1.1, visualizes the number of students exhibiting different head orientations over time, including facing forward (dark turquoise), downward (bright yellow), right (medium orchid), and left (hot pink), with a dash line indicating total student count. According to the analysis, a total of {{Head\_Total\_Students}} students were detected. The most significant head movement events occurred at {{Head\_Time}}, where {{Number\_of\_Students\_Right}} students were facing right, {{Number\_of\_Students\_Left}} students were facing left, {{Number\_of\_Students\_Down}} students were looking downward, and {{Number\_of\_Students\_Down}} were facing forward.

The arm movement analysis, shown in Diagram 1.2, tracks the number of students performing various arm positions such as right arm extending sidewards (dark orange), resting (steel blue), or unknown (light sea green), as well as left arm extending sidewards (tomato red), resting (forest green), or unknown (blue violet). The dashed line again represents the total student count. A total of {{Arm\_Total\_Students}} students were detected, with peak actions recorded at {{Arm\_Time}}, where {{Number\_of\_Students\_Extended}} extended their arms, {{Number\_of\_Students\_RestingArms}} kept their arms resting, and {{Number\_of\_Students\_ArmUnknown}} had unknown arm movements.

Heatmap visualizations were created to assess spatial activity at various intervals (25%, 50%, 75%, and 100%) of the video duration. Diagram 1.3 through Diagram 1.6 show these heatmaps for all detected actions, revealing how behavior evolves as the exam progresses. Diagram 1.7 further consolidates all action data across the full video, while Diagrams 1.8 to 1.19 isolate specific behaviors such as sitting, standing, various arm movements, and head orientations. These visualizations help identify hotspots and zones of frequent activity or behavioral changes within the classroom.

Complementing the heatmaps, a series of line graphs provide a temporal view of student behaviors. Diagram 2.1 shows the trends for all actions combined, while Diagrams 2.2 to 2.6 detail patterns in specific movements like sitting and extending or resting arms. These graphs contribute to understanding the duration and timing of student engagement or inactivity, as well as identifying periods of ambiguous or unknown behaviors detected by the model.