In [6]:
```
!pip install opencv-python
!pip install jupyter

!pip install nbconvert

!nbconvert --allow-chromium-download final_project.ipynb
!playwright install chromium



import pandas as pd
import re
import scipy.io as spio
import numpy as np
import statistics
import matplotlib.pyplot as plt
import plotly.graph_objects as go
import cv2
import os
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Requirement already satisfied: opencv-python in c:\users\isc\appdata\local\programs\py
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Requirement already satisfied: numpy>=1.17.0 in c:\users\isc\appdata\local\programs\py
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Requirement already satisfied: tornado>=6.1 in c:\users\isc\appdata\local\programs\pyt
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Requirement already satisfied: importlib-metadata>=3.6 in c:\users\isc\appdata\local\p
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Requirement already satisfied: jedi>=0.16 in c:\users\isc\appdata\local\programs\pytho
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Requirement already satisfied: pywin32>=300 in c:\users\isc\appdata\local\programs\pyt
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Requirement already satisfied: prometheus-client in c:\users\isc\appdata\local\program
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Requirement already satisfied: idna>=2.8 in c:\users\isc\appdata\local\programs\python
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Requirement already satisfied: pyyaml>=5.3 in c:\users\isc\appdata\local\programs\pyth
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Requirement already satisfied: webcolors>=1.11 in c:\users\isc\appdata\local\programs
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Requirement already satisfied: jupyterlab-pygments in c:\users\isc\appdata\local\progr
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Requirement already satisfied: nbclient>=0.5.0 in c:\users\isc\appdata\local\programs
\python\python39\lib\site-packages (from nbconvert) (0.8.0)
Requirement already satisfied: nbformat>=5.7 in c:\users\isc\appdata\local\programs\py
thon\python39\lib\site-packages (from nbconvert) (5.9.2)
Requirement already satisfied: packaging in c:\users\isc\appdata\local\programs\python
\python39\lib\site-packages (from nbconvert) (23.1)
Requirement already satisfied: pandocfilters>=1.4.1 in c:\users\isc\appdata\local\prog
rams\python\python39\lib\site-packages (from nbconvert) (1.5.0)
```

```
Requirement already satisfied: pygments>=2.4.1 in c:\users\isc\appdata\local\programs
\python\python39\lib\site-packages (from nbconvert) (2.16.1)
Requirement already satisfied: tinycss2 in c:\users\isc\appdata\local\programs\python
\python39\lib\site-packages (from nbconvert) (1.2.1)
Requirement already satisfied: traitlets>=5.1 in c:\users\isc\appdata\local\programs\p
ython\python39\lib\site-packages (from nbconvert) (5.10.0)
Requirement already satisfied: six>=1.9.0 in c:\users\isc\appdata\local\programs\pytho
n\python39\lib\site-packages (from bleach!=5.0.0->nbconvert) (1.16.0)
Requirement already satisfied: webencodings in c:\users\isc\appdata\local\programs\pyt
hon\python39\lib\site-packages (from bleach!=5.0.0->nbconvert) (0.5.1)
Requirement already satisfied: zipp>=0.5 in c:\users\isc\appdata\local\programs\python
\python39\lib\site-packages (from importlib-metadata>=3.6->nbconvert) (3.16.2)
Requirement already satisfied: platformdirs>=2.5 in c:\users\isc\appdata\local\program
s\python\python39\lib\site-packages (from jupyter-core>=4.7->nbconvert) (3.10.0)
Requirement already satisfied: pywin32>=300 in c:\users\isc\appdata\local\programs\pyt
hon\python39\lib\site-packages (from jupyter-core>=4.7->nbconvert) (306)
Requirement already satisfied: jupyter-client>=6.1.12 in c:\users\isc\appdata\local\pr
ograms\python\python39\lib\site-packages (from nbclient>=0.5.0->nbconvert) (8.3.1)
Requirement already satisfied: fastjsonschema in c:\users\isc\appdata\local\programs\p
ython\python39\lib\site-packages (from nbformat>=5.7->nbconvert) (2.18.0)
Requirement already satisfied: jsonschema>=2.6 in c:\users\isc\appdata\local\programs
\python\python39\lib\site-packages (from nbformat>=5.7->nbconvert) (4.19.0)
Requirement already satisfied: soupsieve>1.2 in c:\users\isc\appdata\local\programs\py
thon\python39\lib\site-packages (from beautifulsoup4->nbconvert) (2.5)
Requirement already satisfied: attrs>=22.2.0 in c:\users\isc\appdata\local\programs\py
thon\python39\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7->nbconvert) (23.
1.0)
Requirement already satisfied: jsonschema-specifications>=2023.03.6 in c:\users\isc\ap
pdata\local\programs\python\python39\lib\site-packages (from jsonschema>=2.6->nbformat
>=5.7->nbconvert) (2023.7.1)
Requirement already satisfied: referencing>=0.28.4 in c:\users\isc\appdata\local\progr
ams\python\python39\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7->nbconvert)
(0.30.2)
Requirement already satisfied: rpds-py>=0.7.1 in c:\users\isc\appdata\local\programs\p
ython\python39\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7->nbconvert) (0.1
0.3)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\isc\appdata\local\pr
ograms\python\python39\lib\site-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0
->nbconvert) (2.8.2)
Requirement already satisfied: pyzmq>=23.0 in c:\users\isc\appdata\local\programs\pyth
on\python39\lib\site-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0->nbconver
t) (25.1.1)
Requirement already satisfied: tornado>=6.2 in c:\users\isc\appdata\local\programs\pyt
hon\python39\lib\site-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0->nbconver
t) (6.3.3)
'nbconvert' is not recognized as an internal or external command,
operable program or batch file.
```

In [ ]:

```python
def loadmat(filename):
    def _check_keys(d):
        for key in d:
            if isinstance(d[key], spio.matlab.mio5_params.mat_struct):
                d[key] = _todict(d[key])
        return d

    def _todict(matobj):
```

```
        d = {}
        for strg in matobj._fieldnames:
            elem = matobj.__dict__[strg]
            if isinstance(elem, spio.matlab.mio5_params.mat_struct):
                d[strg] = _todict(elem)
            elif isinstance(elem, np.ndarray):
                d[strg] = _tolist(elem)
            else:
                d[strg] = elem
        return d

    def _tolist(ndarray):
        elem_list = []
        for sub_elem in ndarray:
            if isinstance(sub_elem, spio.matlab.mio5_params.mat_struct):
                elem_list.append(_todict(sub_elem))
            elif isinstance(sub_elem, np.ndarray):
                elem_list.append(_tolist(sub_elem))
            else:
                elem_list.append(sub_elem)
        return elem_list
    data = spio.loadmat(filename, struct_as_record=False, squeeze_me=True)
    return _check_keys(data)
```

In [ ]:

```
def calculate_z_scores(dataframe, column_name):
    # Calculate the mean and standard deviation of the specified column
    mean = dataframe[column_name].mean()
    std = dataframe[column_name].std()

    # Calculate the Z-scores for the specified column
    z_scores = (dataframe[column_name] - mean) / std

    # Create a new DataFrame with the Z-scores added as a new column
    result_df = dataframe.copy()
    result_df['z_score_' + column_name] = z_scores

    return result_df
```

In [ ]:

```
def plot_divided_dfs(divided_dfs, x_column, y_column, numeric_part, y_axis_name, min_
    import pandas as pd
    import plotly.graph_objs as go

    # Create a figure
    fig = go.Figure()

    # Define a time offset for each subset
    time_offset = 0

    # Iterate over the divided DataFrames
    for i, df in enumerate(divided_dfs):
        # Create a new filtered DataFrame based on the specified range
        filtered_df = df.copy()
        if min_value is not None:
            filtered_df = filtered_df[filtered_df[y_column] >= min_value]
        if max_value is not None:
```

```
            filtered_df = filtered_df[filtered_df[y_column] <= max_value]

        # Create a scatter trace for the current subset with the adjusted x-values
        trace = go.Scatter(
            x=filtered_df[x_column] + time_offset,
            y=filtered_df[y_column],
            mode='lines',
            name=f'Movie {i + 1}'
        )

        # Add the trace to the figure
        fig.add_trace(trace)

        # Update the time offset for the next subset
        time_offset += max(filtered_df[x_column])  # Use the maximum x_column value c

    # Update layout
    fig.update_layout(
        xaxis_title='Time [sec]',
        yaxis_title=y_axis_name,
        title=y_column + ' Subject ' + numeric_part,
        showlegend=True
    )

    # Show the plot
    fig.show()
    fig.write_html(f'{y_column}_Subject_{numeric_part}.html')
```

אתה צריך לשים רקאת הכתובת של התיקייה שאליה ישמרו כל הדברים , את הכתובת של קובץ טקסט שאנחנו מוציאים שמכיל את הזמנים והדגימות

ואת הקובץ מטלב של הטובי

In [ ]:
```
output_directory = r"C:\Users\hadar.yehuda\Desktop\אנדריי\Name4"
file_path_txt = r"C:\Users\hadar.yehuda\Desktop\אנדריי\Name4\Name4.txt"
mat = loadmat(r"C:\Users\hadar.yehuda\Desktop\אנדריי\Name4\Name4_run1.mat")
```

In [ ]:
```
target_keyword = "_converted"
file_list = os.listdir(output_directory)
txt_files_with_keyword = [file for file in file_list if target_keyword in file and fi
matching_file_paths = [os.path.join(output_directory, file) for file in txt_files_wit
file_path_plux =matching_file_paths[0]
file_path_plux
```

In [ ]:
```
path_parts = output_directory.split("\\")
last_part = path_parts[-1]
numeric_part = ''.join(filter(str.isdigit, last_part))
```

In [ ]:
```
with open(file_path_txt, "r") as file:
    lines = file.readlines()

filtered_lines = [line.strip() for line in lines if "Sample movie start" in line or "
filtered_lines_with_date = [line for line in filtered_lines if re.search(r'\d{2}-\w{3
```

```
start_numbers = []
end_numbers = []
start_times = []
end_times = []

for i in range(len(lines)):
    line = lines[i].strip()

    if "The first BioSignals" in line:
        next_line = lines[i + 2]  # Get the line containing the number
        number = float(next_line.strip().split()[0])  # Extract the number
        start_numbers.append(number)

        match = re.search(r'\d{2}:\d{2}:\d{2}', lines[i - 1])
        if match:
            start_times.append(match.group())

    elif "The last BioSignals" in line:
        next_line = lines[i + 2]  # Get the line containing the number
        number = float(next_line.strip().split()[0])  # Extract the number
        end_numbers.append(number)

        match = re.search(r'\d{2}:\d{2}:\d{2}', lines[i - 1])
        if match:
            end_times.append(match.group())

print("start_numbers =", start_numbers)
print("end_numbers =", end_numbers)
print("start_times =", start_times)
print("end_times =", end_times)
```

In [ ]:

```
start_systemTimeStamp = []
end_systemTimeStamp = []
start_times_t = []
end_times_t = []

for line in lines:
    line = line.strip()

    if "*Start* time :" in line:
        number = re.search(r': (\d+)', line)
        if number:
            start_systemTimeStamp.append(number.group(1))

        match = re.search(r'\d{2}:\d{2}:\d{2}', line)
        if match:
            start_times_t.append(match.group())

    if "*End* time :" in line:
        number = re.search(r': (\d+)', line)
        if number:
            end_systemTimeStamp.append(number.group(1))

        match = re.search(r'\d{2}:\d{2}:\d{2}', line)
        if match:
            end_times_t.append(match.group())
```

```
print("Start System TimeStamp =", start_systemTimeStamp)
print("End System TimeStamp =", end_systemTimeStamp)
print("start_times =", start_times_t)
print("end_times =", end_times_t)
```

In [ ]:
```
data_left = mat['dat']['data']['gaze']['left']['pupil']['diameter']
data_right = mat['dat']['data']['gaze']['right']['pupil']['diameter']
```

In [ ]:
```
DisplayArea_left_x = mat['dat']['data']['gaze']['left']['gazePoint']['onDisplayArea']
DisplayArea_right_x = mat['dat']['data']['gaze']['right']['gazePoint']['onDisplayArea
DisplayArea_left_y = mat['dat']['data']['gaze']['left']['gazePoint']['onDisplayArea']
DisplayArea_right_y = mat['dat']['data']['gaze']['right']['gazePoint']['onDisplayArea
```

In [ ]:
```
time_stamp = mat['dat']['data']['gaze']['systemTimeStamp']
df_t = pd.DataFrame({'time_stamp' : time_stamp,
                     'data_left':data_left ,'data_right':data_right,'DisplayArea_left
                     'DisplayArea_right_x':DisplayArea_right_x,'DisplayArea_left_y':D
                     'DisplayArea_right_y':DisplayArea_right_y})
```

In [ ]:
```
df_t = calculate_z_scores(df_t, 'data_left')
df_t = calculate_z_scores(df_t, 'data_right')
```

In [ ]:
```
lines_to_skip = 3
df = pd.read_csv(file_path_plux, delimiter="\t", skiprows=range(lines_to_skip), heade
df = df.iloc[:, :5]
df.columns = ["sample_num", "Column2", "PZT", "BVP" ,"EDA"]
df = calculate_z_scores(df, 'PZT')
df = calculate_z_scores(df, 'BVP')
df = calculate_z_scores(df, 'EDA')
```

In [ ]:
```
df_t.to_csv(os.path.join(output_directory, 'reference_data.csv'), index=False)
df.to_csv(os.path.join(output_directory, 'data.csv'), index=False)
```

כאן אתה צריך ללכת לקוד של המטלב שנקרא resample
לשנות את כתובות של התיקייה במטלב ולהריץ
data_file_path = "C:\Users\hadar.yehuda\Desktop\אנדריי\Name4\data.csv"; reference_file_path = "C:\Users\hadar.yehuda\Desktop\אנדריי\Name4\reference_data.csv"; אחרי שזה רץ אתה ממשיך את הקוד

In [ ]:
```
csv_path = os.path.join(output_directory, "sorted_resampled_data.csv")
resampled_df = pd.read_csv(csv_path)
sorted_resampled_df = resampled_df.sort_values(by='sample_num')
```

In [ ]:
```
merged_df = pd.merge(sorted_resampled_df, df_t, left_index=True, right_index=True, ho
merged_df.to_csv(os.path.join(output_directory, 'all_data.csv'), index=False)
```

In [ ]:
```
divided_dfs = []
resampled_df = sorted_resampled_df
for i in range(len(start_numbers)):
    start = start_numbers[i]
    end = end_numbers[i]
```

```
    subset_df = resampled_df[(resampled_df["sample_num"] >= start) & (resampled_df["s
    subset_df = subset_df.reset_index(drop=True)  # Reset the index
    divided_dfs.append(subset_df)

#for i, df in enumerate(divided_dfs):
#    print(f"Subset {i+1}:")
#    print(df)
#    print()
```

In [ ]:
```
# Iterate over the divided DataFrames
for i, df in enumerate(divided_dfs):
    start_time = pd.to_datetime(start_times[i], format="%H:%M:%S")  # Convert start t
    end_time = pd.to_datetime(end_times[i], format="%H:%M:%S")  # Convert end time to

    # Calculate the time interval between start and end time
    time_interval = (end_time - start_time) / (len(df) - 1)

    # Calculate the time for each sample based on the violation count
    sample_times = [start_time + idx * time_interval for idx in range(len(df))]

    # Calculate the time in seconds since the beginning of the interval
    time_deltas = [(t - start_time).total_seconds() for t in sample_times]
    df['time_N'] = time_deltas

    # Print the modified DataFrame
    print(f"Subset {i+1}:")
    print(df)
    print()
```

In [ ]:
```
os.makedirs(output_directory, exist_ok=True)

# Iterate over the divided DataFrames
for i, df in enumerate(divided_dfs):
    # Construct the CSV file name using the loop index
    csv_file_name = f"movie_{i+1}_opensignals.csv"

    # Save the DataFrame to a CSV file
    df.to_csv(os.path.join(output_directory, csv_file_name), index=False)

    print(f"Subset {i+1} saved to {csv_file_name}")
```

In [ ]:
```
plot_divided_dfs(divided_dfs, 'time_N', 'z_score_EDA',numeric_part , 'EDA[uS]')
```

In [ ]:
```
plot_divided_dfs(divided_dfs, 'time_N', 'z_score_BVP',numeric_part , 'BVP[µV]',-1.5,1
```

In [ ]:
```
plot_divided_dfs(divided_dfs, 'time_N', 'z_score_PZT', numeric_part, 'PZT[v]')
```

In [ ]:
```
divided_dfs_t = []

for i in range(len(start_systemTimeStamp)):
    start = int(start_systemTimeStamp[i])
    end = int(end_systemTimeStamp[i])
    subset_df = df_t[(df_t["time_stamp"] >= start) & (df_t["time_stamp"] <= end)]
    subset_df = subset_df.reset_index(drop=True)  # Reset the index
```

```
    divided_dfs_t.append(subset_df)

for i, df in enumerate(divided_dfs_t):
    print(f"Subset {i+1}:")
    print(df)
    print()
```

In [ ]:
```
# Iterate over the divided DataFrames
for i, df in enumerate(divided_dfs_t):
    start_time = pd.to_datetime(start_times[i], format="%H:%M:%S")  # Convert start t
    end_time = pd.to_datetime(end_times[i], format="%H:%M:%S")  # Convert end time to

    # Calculate the time interval between start and end time
    time_interval = (end_time - start_time) / (len(df) - 1)
    # Calculate the time for each sample based on the violation count
    sample_times = [start_time + idx * time_interval for idx in range(len(df))]

    # Add the time column to the DataFrame and remove the date portion
    time_deltas = [(t - start_time).total_seconds() for t in sample_times]
    df['time_N'] = time_deltas

    df['pupil Diameter_average'] = df[['data_left', 'data_right']].mean(axis=1)
    df['pupil Diameter'] = df[['z_score_data_left', 'z_score_data_right']].mean(axis=
    df['average_DisplayArea_y'] = df[['DisplayArea_left_y', 'DisplayArea_right_y']].m
    df['average_DisplayArea_x'] = df[['DisplayArea_left_x', 'DisplayArea_right_x']].m

    # Print the modified DataFrame
    print(f"Subset {i+1}:")
    print(df)
    print()
```

In [ ]:
```
plot_divided_dfs(divided_dfs_t, 'time_N', 'pupil Diameter',numeric_part, 'pupil Diame
```

In [ ]:
```
os.makedirs(output_directory, exist_ok=True)

# Iterate over the divided DataFrames
for i, df in enumerate(divided_dfs_t):
    # Construct the CSV file name using the loop index
    csv_file_name = f"movie_{i+1}_processed.csv"

    # Save the DataFrame to a CSV file
    df.to_csv(os.path.join(output_directory, csv_file_name), index=False)

    print(f"Subset {i+1} saved to {csv_file_name}")
```