

# Process Mining and Intelligence Project

## Emotion Based Music Selection

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## 1 Task-level modeling

### 1.1 Segregation system

#### 1.1.1 Check data balancing

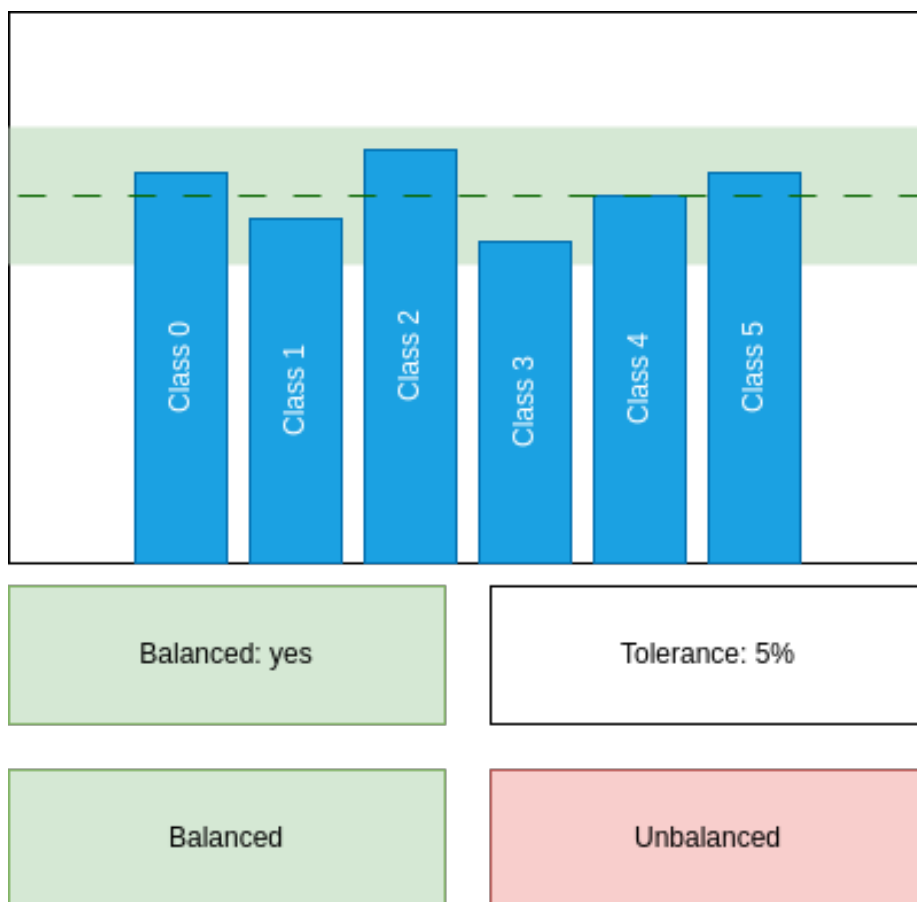


Figure 1: "Check data balancing" mock-up form

| Step  | O | CL | S | SC |
|---|---|----|---|----|
| 1 <b>ACTOR</b> opens "Check data balancing" form.                 |   |    |   |    |
| 2 <b>SYSTEM</b> shows the report.                                 |   |    |   |    |
| 3 <b>SYSTEM</b> shows a hint whether the data is balanced or not. |   |    |   |    |
| 4 <b>ACTOR</b> checks threshold in the UI.                        |   |    |   |    |
| 5 <b>FOR</b> each column in the report:                           |   |    |   |    |
| 5.1 <b>IF</b> the column is not within the displayed threshold.   |   |    |   |    |
| 5.1.1 <b>THEN</b> the data is not balanced.                       |   |    |   |    |
| 6.1 <b>IF</b> the data is balanced.                               |   |    |   |    |
| 6.1.1 <b>ACTOR</b> clicks "Balanced" button.                      |   |    |   |    |
| 6.2 <b>ELSE</b>   |   |    |   |    |
| 6.2.1 <b>ACTOR</b> clicks "Unbalanced" button.                    |   |    |   |    |
| 7 <b>SYSTEM</b> shows a confirmation dialog.                      |   |    |   |    |
| 8 <b>ACTOR</b> closes the form.                                   |   |    |   |    |
| Human task cost   |   |    |   |    |

Table 1: Detailed use case for "Check data balancing" task

### 1.1.2 Check input coverage

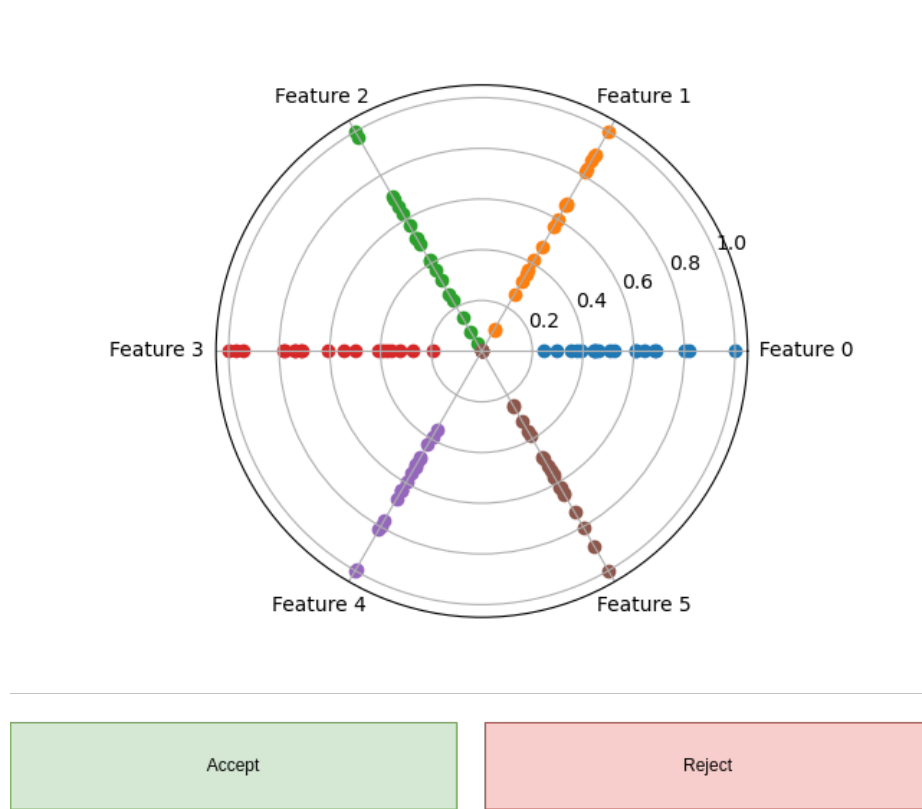


Figure 2: "Check input coverage" mock-up form

| Step  | O | CL | S | SC |
|---|---|----|---|----|
| 1 <b>ACTOR</b> opens "Check input coverage" form.                     |   |    |   |    |
| 2 <b>SYSTEM</b> shows a radar scatter plot of the input distribution. |   |    |   |    |
| 3 <b>FOR</b> each radius in the radar scatter plot:                   |   |    |   |    |
| 3.1 <b>IF</b> the distribution is not uniform as expected.            |   |    |   |    |
| 3.1.1 <b>THEN</b> the input coverage is not satisfied.                |   |    |   |    |
| 4.1 <b>IF</b> the input coverage is satisfied.                        |   |    |   |    |
| 4.1.1 <b>ACTOR</b> clicks "Accept" button.                            |   |    |   |    |
| 4.2 <b>ELSE</b>   |   |    |   |    |
| 4.2.1 <b>ACTOR</b> clicks "Reject" button.                            |   |    |   |    |
| 5 <b>SYSTEM</b> shows a confirmation dialog.                          |   |    |   |    |
| 6 <b>ACTOR</b> closes the form.                                       |   |    |   |    |
| Human task cost   |   |    |   |    |

Table 2: Detailed use case for "Check input coverage" task

## 1.2 Development system

### 1.2.1 Set iteration number

Set Iteration Number

Current Iteration Number 10

Enter New Iteration Number:

Submit

Iteration number updated successfully!

Figure 3: "Set iteration number" mock-up form

| Step   | O | CL | S | SC |
|--|---|----|---|----|
| 1 <b>ACTOR</b> opens "Set Iteration Number" form.                      |   |    |   |    |
| 2 <b>SYSTEM</b> displays the current iteration number.                 |   |    |   |    |
| 3 <b>ACTOR</b> inputs the desired number of iterations.                |   |    |   |    |
| 4 <b>ACTOR</b> clicks "Submit" button to confirm the iteration number. |   |    |   |    |
| 5 <b>SYSTEM</b> shows a confirmation dialog.                           |   |    |   |    |
| 6 <b>ACTOR</b> closes the form.  |   |    |   |    |
| Human task cost  |   |    |   |    |

Table 3: Detailed use case for "Set iteration number" task

### 1.2.2 Check learning plot

| Step  | O | CL | S | SC |
|---|---|----|---|----|
| 1 <b>ACTOR</b> opens "Check training report" form.                  |   |    |   |    |
| 2 <b>SYSTEM</b> shows the training loss curve.                      |   |    |   |    |
| 3.1 <b>IF</b> the loss is flat for at least half of the iterations: |   |    |   |    |
| 3.1.1 <b>THEN ACTOR</b> clicks "Overfit" button.                    |   |    |   |    |
| 3.2 <b>IF</b> the loss is not flat at the end of the iterations:    |   |    |   |    |
| 3.2.1 <b>THEN ACTOR</b> clicks "Underfit" button.                   |   |    |   |    |
| 3.3 <b>ELSE</b>   |   |    |   |    |
| 3.3.1 <b>ACTOR</b> clicks "Approved" button.                        |   |    |   |    |
| 4 <b>SYSTEM</b> shows a confirmation dialog.                        |   |    |   |    |
| 5 <b>ACTOR</b> closes the form.                                     |   |    |   |    |
| Human task cost   |   |    |   |    |

Table 4: Detailed use case for "Check training report" task

### 1.2.3 Check validation report

### 1.2.4 Check test results

|     |       |         |           |          |           |
|-----|-------|---------|-----------|----------|-----------|
| ID  | Depth | Neurons | Valid MSE | Test MSE | Delta MSE |
| 954 | 3     | 4000    | 0.14      | 0.15     | 0.01      |

|                        |      |
|------------------------|------|
| Overfitting Tolerance: | 0.10 |
|------------------------|------|

|        |        |
|--------|--------|
| Accept | Reject |
|--------|--------|

Figure 4: "Check test results" mock-up form

| Step   | O | CL | S | SC |
|--|---|----|---|----|
| 1 <b>ACTOR</b> opens "Check test results" form.  |   |    |   |    |
| 2 <b>SYSTEM</b> shows the test results.  |   |    |   |    |
| 3 <b>ACTOR</b> checks if the difference between the test results and the validation results is within overfitting tolerance. |   |    |   |    |
| 4.1 <b>IF</b> the test results is not satisfactory.  |   |    |   |    |
| 4.1.1 <b>ACTOR</b> clicks "Reject" button.   |   |    |   |    |
| 4.2 <b>ELSE</b>  |   |    |   |    |
| 4.2.1 <b>ACTOR</b> clicks "Approve" button.  |   |    |   |    |
| 5 <b>SYSTEM</b> shows a confirmation dialog.   |   |    |   |    |
| 6 <b>ACTOR</b> closes the form.  |   |    |   |    |
| Human task cost  |   |    |   |    |

Table 5: Detailed use case for "Check test results" task

### 1.3 Evaluation system

#### 1.3.1 Evaluate classifier performance

The mock-up form is titled "Evaluate Classifier Performance" and includes a close button (X) in the top right corner. It contains a table with the following data:

| Session ID | Expert Label | Classifier Label | Error |
|------------|--------------|------------------|-------|
| 0          | 1            | 2                | Yes   |
| 1          | 1            | 3                | Yes   |
| 2          | 2            | 1                | Yes   |
| 3          | 3            | 3                | No    |

Below the table, the thresholds are defined:

Max number of errors tolerated (th1): 4  
Max number of consecutive error tolerated (th 2) :2

At the bottom, there are two status boxes and two action buttons:

- A green box labeled "th1 satisfied" with the calculation  $3 < 4$ .
- A red box labeled "th 2 exceeded" with the calculation  $3 > 2$ .
- A "Pass" button.
- A "Fail" button.

Figure 5: "Evaluate Classifier Performance" mock-up form

| Step  | O | CL | S | SC |
|---|---|----|---|----|
| 1 <b>ACTOR</b> opens the "Evaluate Classifier Performance" form.  |   |    |   |    |
| 2 <b>SYSTEM</b> displays a table of sessions with Expert Label (ground truth) and Classifier Label (predicted label). The difference between the labels (if any) represents an error. |   |    |   |    |
| 3 <b>ACTOR</b> reviews the table.   |   |    |   |    |
| 3.1 <b>IF</b> the total errors or consecutive errors exceed their respective thresholds:  |   |    |   |    |
| 3.1.1 <b>ACTOR</b> clicks the "Fail" button.  |   |    |   |    |
| 3.2 <b>ELSE</b>   |   |    |   |    |
| 3.2.1 <b>ACTOR</b> clicks the "Pass" button.  |   |    |   |    |
| 4 <b>SYSTEM</b> shows a confirmation dialog.  |   |    |   |    |
| 5 <b>ACTOR</b> closes the form.   |   |    |   |    |
| Human task cost   |   |    |   |    |

Table 6: Detailed use case for "Evaluate Classifier Performance" task