**Deliverable 2 | Kaiwen Zhong (kz54)**

**Analyze Emotions of Multiple People’s Images**

**Relevant MatLab code:** comparison.m

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| --- | --- | --- | --- | --- | --- |
| Subject Left Out | Correctly Classified Images | Correct Percentage | Highest Precision Emotion | Highest Recall Emotion | Note |
| Student 1 | 26.42% | 14 | 4-Sad | 5-Happy |  |
| Student 2 | 46.00% | 23 | 2-Angry | 3-surprised, 4-sad |  |
| Student 3 | 25.00% | 12 | 4-sad | 2-angry |  |
| Student 4 | 38.78% | 19 | 1-neutral, 4-sad | 5-happy |  |
| Student 5 | 18.87% | 10 | 1-neutral | 2-angry | My own image |

Running Multilayer Perceptron algorithm on 5 students’ data, where Student 5 was myself using LOSO, I obtained varied results. The highest accuracy comes from when Student 2 is left out (46%, 23 images correctly classified). Detailed results and confusion matrix can be found in file **deliverable2.txt** in the same directory. I did not copy them into the .doc file because the copy messes up the format of the result.

**Findings:**

1. Leave 1st student out:

* There are no 2-angry and 3-surprised emotions classified correctly.
* There is much confusion between 2-angry and 5-happy. Specifically, 10 2-angry images are categorized as happy, causing low recall for happy. It is likely that some people opened their mouth in angry images, and some did not, causing the confusion.
* 4-sad is classified with 100% precision, meaning that all pictures classified as sad are actually 4-sad.

1. Leave 2nd student out:

* There are no 1-neutral images classified correctly.
* 3-surprised and 4-sad are categorized with high recall, as most pictures that are actually 3-surprised or 4-sad are correctly classified.
* Student 2’s images are classified more correctly, perhaps because his/her facial expressions are more “standard” among or similar to other students.

1. Leave 3rd student out:

* There are no 3-surprised and 5-happy emotions classified correctly, and no images are classified as 3-surprised and 5-happy.
* 3-surprised emotions are most commonly classified as 2-angry, which might be because of the feature of enlarged eye.

1. Leave 4th student out:

* There are no 2-angry emotions classified correctly.
* Most pictures are classified as 5-happy, and 5-happy has the highest recall among the emotions, as most 5-happy images besides two are correctly classified.

1. Leave 5th student (my images) out:

* There are no 3-surprised and 5-happy emotions classified correctly, and no images are classified as 5-happy.
* Most 5-happy images are classified as b-angry. A possible explanation is that in my happy emotions, I sometimes did not open my mouth, and it might have resulted in puffed cheeks, which looks similar to other people’s angry emotions.