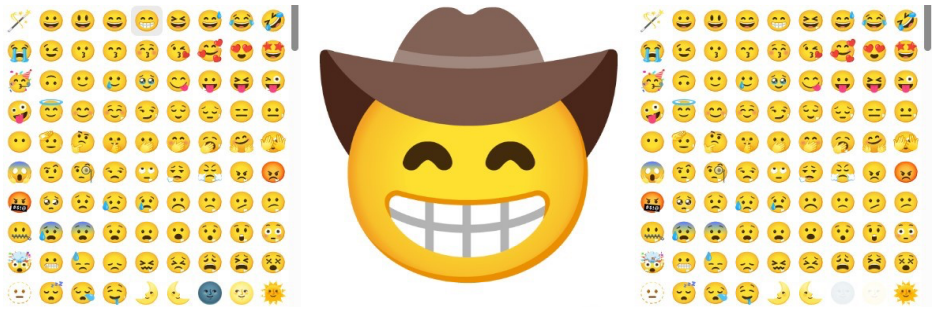
COMP4423 – Computer Vision

Assignment 1

Emoji Prediction

[Deadline: 23:59:00 Wen 13th March 2024]

Emoji Kitchen



1. Task Description

As you experienced in the sixth tutorial using machine learning algorithms to identify items you filmed. Now it's time to explore the fascinating intersection of emotions and technology. Your assignment is to develop a model that accurately predicts emoji categories, ranging from joy to sadness, human to animal, and more. To assist you, the "**reference**" folder contains a basic implementation and a fundamental emoji category that you can use as a starting point. Feel free to build upon and expand these categories as needed.

This task involves various considerations that you need to address. You will need to ***collect*** datasets and create appropriate categories, ***extract*** relevant features from the data, ***select*** a suitable classifier, ***validate*** the model's performance, ***deploy*** and *test* the model, ***identify*** any challenges or issues that

arise, and devise effective solutions to overcome them. There are no limitations on the algorithm or implementation ideas you can explore.

The model's input should be the image of emojis, and the output should be the category labels. For example, the corresponding output of the input image of the emoji "[ ,  , ]" could be the labels "[*'smiling'*, *'unwell'*, *'joy'*]".

We are not overly concerned with the final accuracy. On the contrary, we are concerned about how you model or formularize this task, how you build or leverage models to address this task, and the sustainability of the model you build. Hence, we kindly request that you **adhere to traditional machine learning approaches** and refrain from utilizing deep learning methods for this task. The objective is to strengthen your understanding and proficiency in machine learning concepts. While deep learning is undoubtedly a convenient and promising tool, its complexity tends to conceal certain intricacies of the underlying processes.

It is essential to **submit a comprehensive report** that outlines the step-bystep process you followed in completing the emoji prediction task within a real-world scenario. Your report should include detailed explanations of your ideas, algorithm design, challenges encountered, corresponding solutions implemented, and any noteworthy findings discovered throughout the task. For additional inspiration and ideas, please refer to the provided **template and sample reports**.

2. Tasks & Assessment

Please submit a single .py file.

Task 1: *Collect emojis*, including those created by Emoji Kitchen, to extend the reference dataset**, *convert the emojis to images, and categorize emojis*** by emotions, species, etc., into about 20-30 categories. **(10 marks)**

Task 2 Design methods to ***extract features*** from emojis and consider whether there are ***better feature extraction methods***. **(10 marks)**

Task 3 ***Train a classifier*** for emoji classification. Consider how to ***validate the classifier*** to improve the test performance further. **(20 marks)**

Task 4: ***Test the classifier*** using emojis created by Emoji Kitchen that are unseen in the training and validation processes. **(10 marks)**

Task 5 Test the model using ***human face emotions datasets,*** such as the face expression dataset from Kaggle, or sketches of facial emotions that you convert from digital portrait images. Consider how to improve the classifier's performance on the new kind of data. **(10 marks)**

Task 6 A report to show the details of your method. Questions in the template should be answered. **(40 marks)**

Bonus: *Submissions with excellent code quality (including comment quality), output accuracy and report quality will be given bonus of no more than 10 marks (the final grade of this assignment will be* $\min(100, normal\_grade + bonus)$*).*

3. Submission

Follow the steps below:

1. Name the .py file as Assignment1_<your_ID>_<your_name>.py.

   e.g., `Assignment1_12345678d_CHAN_Dawen.py`
2. Name the report as Assignment1_<your_ID>_<your_name>.pdf.

   e.g., `Assignment1_12345678d_CHAN_Dawen.pdf`
3. Compress the two files into a .zip file and rename the .zip file.

   e.g., `Assignment1_12345678d_CHAN_Dawen.zip` 4. Upload the .zip file to the blackboard system.

Warning:
If you are unable to complete the whole program, try to accomplish part of the tasks and make sure it can run successfully.

Any wrong file naming and submission will be given a ZERO mark in this assignment.

The deadline for this assignment is **23:59:00 Wen 13th March 2024**.

Late submission penalty 10% is deducted for each day that the work is late. The penalty will be applied up to a maximum number of **three** days after and including the submission deadline day. After three days the work will be marked at zero.

This assignment is individual work. All work must be done on your own. Plagiarism is a serious offense. Copying code from web resources is prohibited as well. Any plagiarism case (for both the copier and the copiee) will be given a ZERO mark in this assignment.