

Lab 1: Image, audio and posture classification

1 Resources

Teachable Machine web: <https://teachablemachine.withgoogle.com>

2 The assignment

Automatic recognition of images, audio and gestures has gained increasing attention in the several fields, for example in emotion recognition, and in areas such as music and dance. Recognizing sounds and postures with machine learning techniques can lead to the creation of artistic installations involving music and dance. Teachable Machine is a web-based tool that makes creating machine learning models easily and without the need to code. Models trained with Teachable Machine may be saved and used in real-world applications, for instance by using them in a python program.

Image Classification

Task 1. Train a model to classify emotions in facial expressions. This is, collect examples of faces portraying different emotions and train a model to discriminate the classes.

Task 1.1 Consider 2 classes: happy and sad

Task 1.2 Consider 3 classes: happy, sad and angry.

Task 1.3 consider 4 classes: happy, sad, angry, and relaxed.

Answer the following questions:

1. What is the accuracy of each model, both reported by the system and does it match your user experience?
2. Try the model with different lighting conditions. Is the user experience accuracy the same as in 1?
3. Try the model with different people. Does this change the user experience accuracy? Try including examples from other people and retrain the model. Does this changes either the accuracy reported by the system or user experience?
4. Discuss how these kind of models could be used in (a) artistic applications, and (b) health and well-being applications.

Task 2. Train a model to classify hand gestures. Collect examples of different hand gestures and train a model to discriminate the classes.

Task 2.1 Consider 2 classes: closed fist and open hand

Task 2.2 Consider 2 classes: 1 finger (index finger) and 2 fingers (index+middle).

Task 2.3 consider 4 classes: 1, 2, 3, and 4 fingers.

Answer the following questions:

1. What is the accuracy of each model, both reported by the system and does it match your user experience?
2. Try the model with different lighting conditions. Is the user experience accuracy the same as in 1?
3. Discuss how these kind of models could be used in (a) artistic applications, and (b) health and well-being applications.

Audio Classification

Task 3. Train a model to classify pitch in singing. Collect background noise examples and examples of different singing pitches and train a model to discriminate the classes.

Task 3.1 Consider 2 different pitches

Task 3.2 Consider 4 different pitches

Task 3.3 Consider 7 different pitches.

Answer the following questions:

1. What is the accuracy of each model, both reported by the system and does it match your user experience?
2. Try the model with different people singing. Is the user experience accuracy the same as in 1? Why?
3. Discuss how these kind of models could be used in (a) artistic applications, and (b) health and well-being applications.

Task 4. Train a model to classify voice commands. Collect background noise examples and examples of different voice commands and train a model to discriminate the classes.

Task 4.1 Consider 2 different classes: up and down comands

Task 4.2 Consider 4 different pitches: up, down, left, right

Task 4.3 Consider a 5 or more of commands of your choice.

Answer the following questions:

1. What is the accuracy of each model, both reported by the system and does it match your user experience?
2. Try the model with different people voices. Is the user experience accuracy the same as in 1? Why?
3. Discuss how these kind of models could be used in (a) artistic applications, and (b) health and well-being applications.

Posture Classification

Task 5. Train a model to classify different body postures. Collect examples of different body postures and train a model to discriminate the classes.

Task 5.1 Consider 2 different postures: arms down and arms up

Task 5.2 Consider 4 different pitches: arms down, arms up, left arm up, right arm up.

Task 5.3 Consider a 5 or more of classes of your choice.

Answer the following questions:

1. Describe the classes considered in Task 4.3.
2. What is the accuracy of each model, both reported by the system and does it match your user experience?
3. Try the model with different people. Is the user experience accuracy the same as in 1? Why?
4. Discuss how these kind of models could be used in (a) artistic applications, and (b) health and well-being applications.

Task 6. Think of an interesting application of machine learning in the arts or health and train a model for it.

Answer the following questions:

1. Describe your application, its accuracy and your methodology for creating your model, as well as how the model could be used in a real-life application.
2. Will your model will be used by one person or by different users? Have you taking this into account when training your model?

Submitting your answer

The Lab can be solved in teams of 2 ,3 or 4 people (1 submission per team). Submission is by email to rafael.ramirez@upf.edu. Subject of the message should be 'Lab 1 – AI and the Arts' Submissions should contain a pdf file with the name of each team member and with the answers to the questions for each task. Comments about the methodology may be included. Submission deadline will be discussed in class.