

APPLIED MACHINE LEARNING SYSTEM ELEC0134 20/21 REPORT

SN: 17011729

ABSTRACT

WRITE ME LAST...

[Link to GitHub Repository](#)

Index Terms— WRITE, ME, LAST

1. INTRODUCTION

Machine learning has been increasingly used to solve classification and regression tasks for which traditional algorithms either don't exist or perform poorly in comparison. Facial detection and classification is a common problem tackled by Machine Learning techniques. Techniques discussed by Viola and Jones [3] have been widely used and were a large stepping stone to more complex facial detection/classification algorithms [4, 5]. Furthermore, the introduction of convolutional neural networks transformed feature extraction and classification in image datasets even more [6, 7].

This project aims to solve 4 classification tasks on 2 different datasets. The datasets being used are a subset of the "Cartoon Set" (cartoonset) dataset provided by Google [1] as well as a subset of the "CelebFaces Attributes" (celebA) provided by Shuo Yang et al [2]. While both datasets consist of image data samples, the former contains computer generated graphics of cartoon images whereas the latter contains cropped and pose corrected images of people. The celebA dataset will contain a larger variation in subject background, lighting and face position compared to the uniform nature of the cartoonset dataset. This will undoubtedly make the classification task more difficult.

On the celebA dataset two binary classification tasks will be tackled; one will try to distinguish between the gender of the person (task A1) and the other will be making classifications on the emotion of the person by making decisions on whether or not they're smiling (task A2). On the cartoon dataset, two multi-class classification tasks will be considered. The first task will try to classify the face-shape of the cartoon (task B1). The final task will classify the eye-colour of the cartoon face (task B2). Face-shapes eye-colour were both limited to 5 classes each in the subset.

§2 will discuss existing architectures for facial feature extraction as well as classification and discuss their effectiveness

relative to one another. §3 and §4 will discuss the description and implementation of the chosen models. Justification for the chosen approach will be given as well as a detailed insight into how those models were realised, trained and tested in python. The obtained results will be analysed in §5 and finally a conclusion will be drawn in §6.

2. LITERATURE SURVEY

3. DESCRIPTION OF MODELS

In this section, you should briefly describe the model you are using for each task, along with the rationale. You may opt to use a single learning algorithm to solve the problem or multiple ones, but bear in mind there are page limitations and that you should explain your rationale behind your choices. That is, the algorithmic description must detail your reasons for selecting a particular model. You can clarify them with flow charts, figures or equations.

3.1. Task A1: the task name

Hello world!

3.2. Task A2: the task name

Hello world!

3.3. Task B1: the task name

Hello world!

3.4. Task B2: the task name

Hello world!

4. IMPLEMENTATION

This section must provide the detailed implementation of your models. In particular, you must provide the name and use of external libraries, explain hyper-parameter selection, training pipeline (if any) and key modules/classes/functions/algorithms. You also must provide a detailed description of the dataset (content, size, format, etc.), any data pre-processing that was applied and how you separate your dataset into training, validation and test sets.

Task	Model	Train Acc	Val Acc	Test Acc
A1				
A2				
B1				
B2				

The execution of your models also should be reported here. In particular, this section should include a thorough discussion on the training convergence and stopping criterion (it is recommended that learning curves graphs be used to this effect).

4.1. Task A1: the task name

4.1.1. module name

Hello world!

4.2. Task A2: the task name

Hello world!

4.3. Task B1: the task name

Hello world!

4.4. Task B2: the task name

Hello world!

5. EXPERIMENTAL RESULTS AND ANALYSIS

This section describes and discusses your results. Additionally, this section should include accuracy prediction scores on a separate test dataset, provided by the module organizers, but not used during your training and validation process. We recommend you use a table to list the tasks, models and results before analysis.

6. CONCLUSION

This last section summarizes the findings and suggests directions for future improvements.

References

- [1] Google. *Cartoon Set: An Image Dataset of Random Characters*. URL: <https://google.github.io/cartoonset/index.html> (visited on 11/30/2020).
- [2] S. Yang et al. "From Facial Parts Responses to Face Detection: A Deep Learning Approach". In: *2015 IEEE International Conference on Computer Vision (ICCV)*. 2015, pp. 3676–3684. DOI: 10.1109/ICCV.2015.419.
- [3] P. Viola and M. Jones. "Rapid object detection using a boosted cascade of simple features". In: *Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition. CVPR 2001*. Vol. 1. 2001, pp. I–I. DOI: 10.1109/CVPR.2001.990517.
- [4] W. LU and M. YANG. "Face Detection Based on Viola-Jones Algorithm Applying Composite Features". In: *2019 International Conference on Robots Intelligent System (ICRIS)*. 2019, pp. 82–85. DOI: 10.1109/ICRIS.2019.00029.
- [5] K. Candra Kirana, S. Wibawanto, and H. Wahyu Herwanto. "Facial Emotion Recognition Based on Viola-Jones Algorithm in the Learning Environment". In: *2018 International Seminar on Application for Technology of Information and Communication*. 2018, pp. 406–410. DOI: 10.1109/ISEMANTIC.2018.8549735.
- [6] Y. Sun, X. Wang, and X. Tang. "Deep Convolutional Network Cascade for Facial Point Detection". In: *2013 IEEE Conference on Computer Vision and Pattern Recognition*. 2013, pp. 3476–3483. DOI: 10.1109/CVPR.2013.446.
- [7] K. Zhang et al. "Joint Face Detection and Alignment Using Multitask Cascaded Convolutional Networks". In: *IEEE Signal Processing Letters* 23.10 (2016), pp. 1499–1503. ISSN: 1558-2361. DOI: 10.1109/LSP.2016.2603342.

Appendices