Feeling Your Images:
Visual Emotion Recognition based on Image Attributes.

Matias Lessa Vaz – up201900194@fc.up.pt
Computer Vision – Universidade do Porto

A brief slide show about why that's important,
the engineering behind the process
and the achieve results.

Objective?

Our primary goal is to move beyond conventional approaches that predominantly focus on facial features.

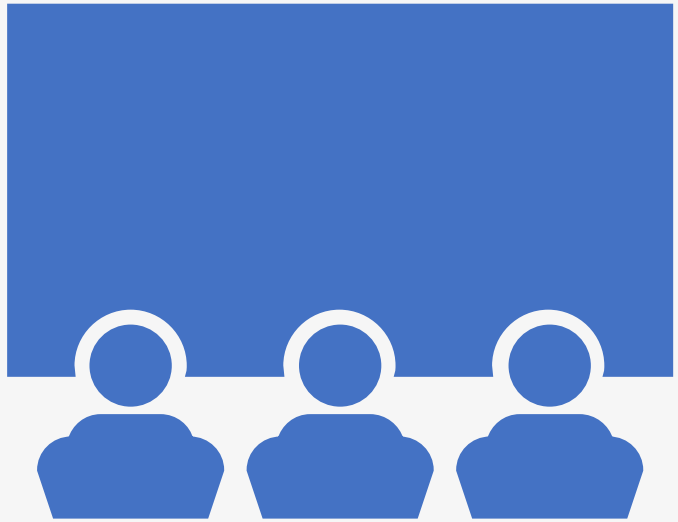
Instead, we aim to develop a robust system that comprehensively understands the visual context of an entire image, offering a nuanced interpretation of the scene.

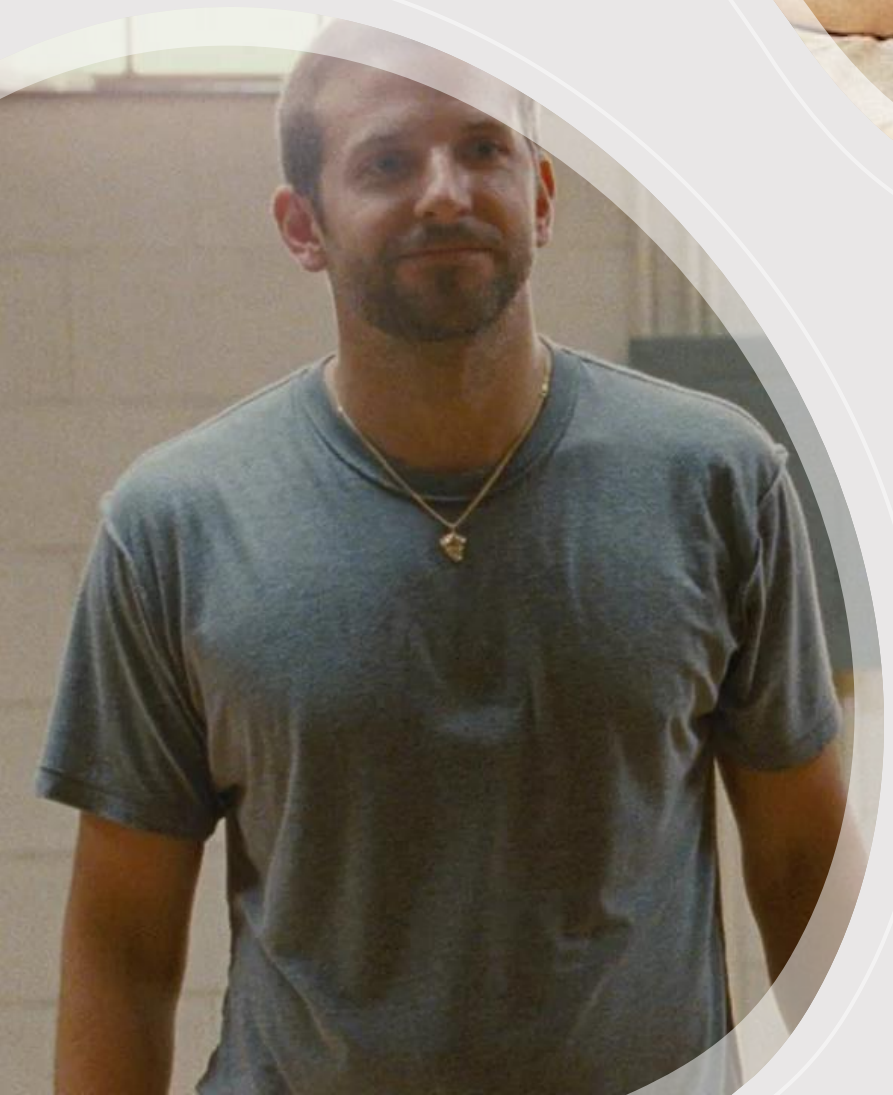
Why?
Possible Applications!

You can understand better the reaction from captured scenes!

That can lead to:

- To improve advertises.
- To understand reactions through real-world captured conflicts.
- Predict movies spectators' reactions.
- To better link with images in newspapers.
- And many more...





Beyond the meaning: Images as feeling carrier

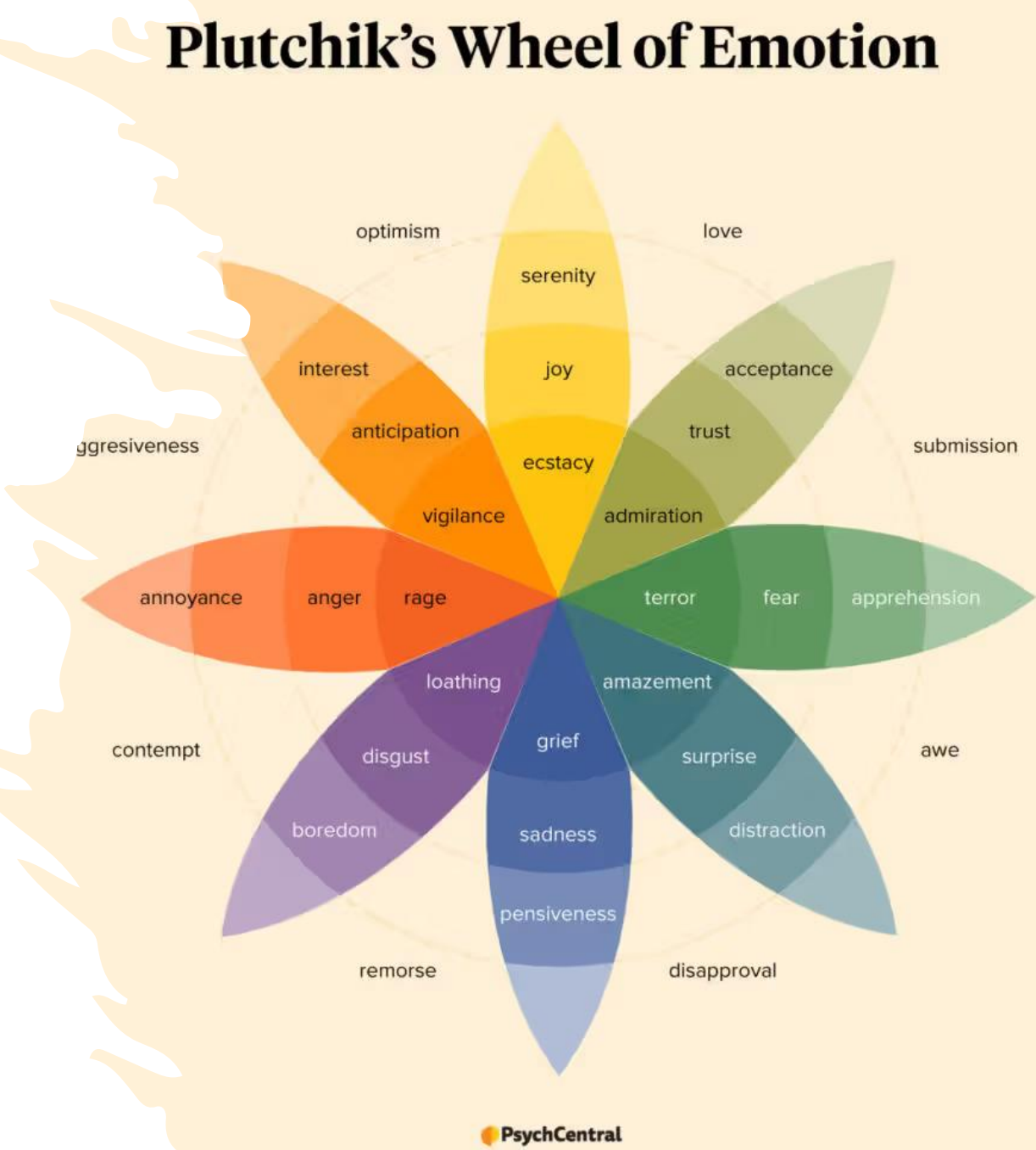
The face expression is most obvious attribute for emotion recognition for images.

But could we find more?

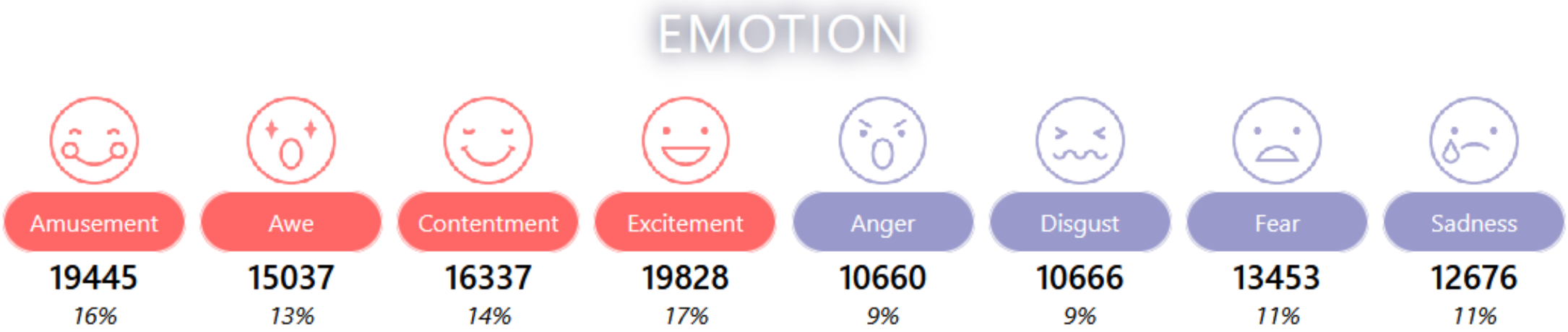
Quoting former USA president Barack Obama:

“Yes, We Can!”

Let’s play a game!



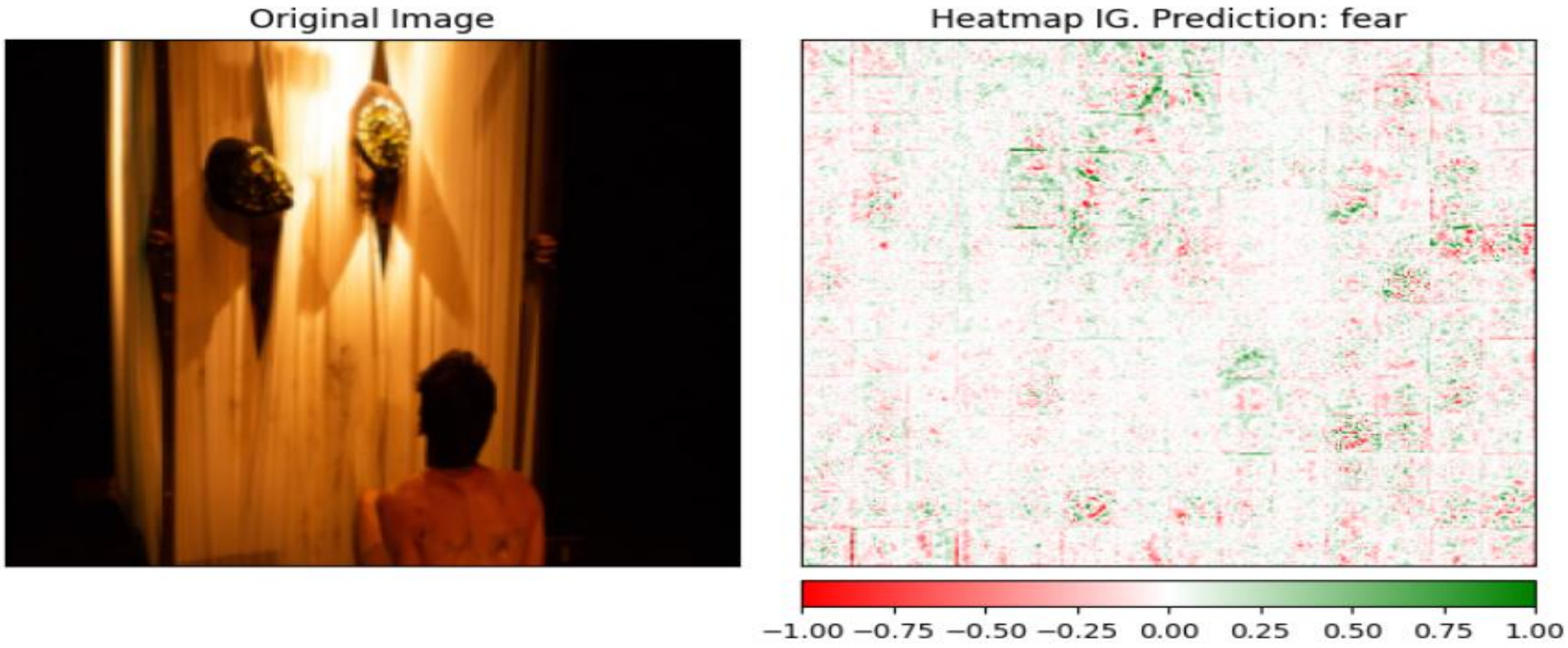
Choose one for the next images!




fear
sadness
disgust
awe
contentment
anger
amusement
excitement


fear
sadness
disgust
awe
contentment
anger
amusement
excitement

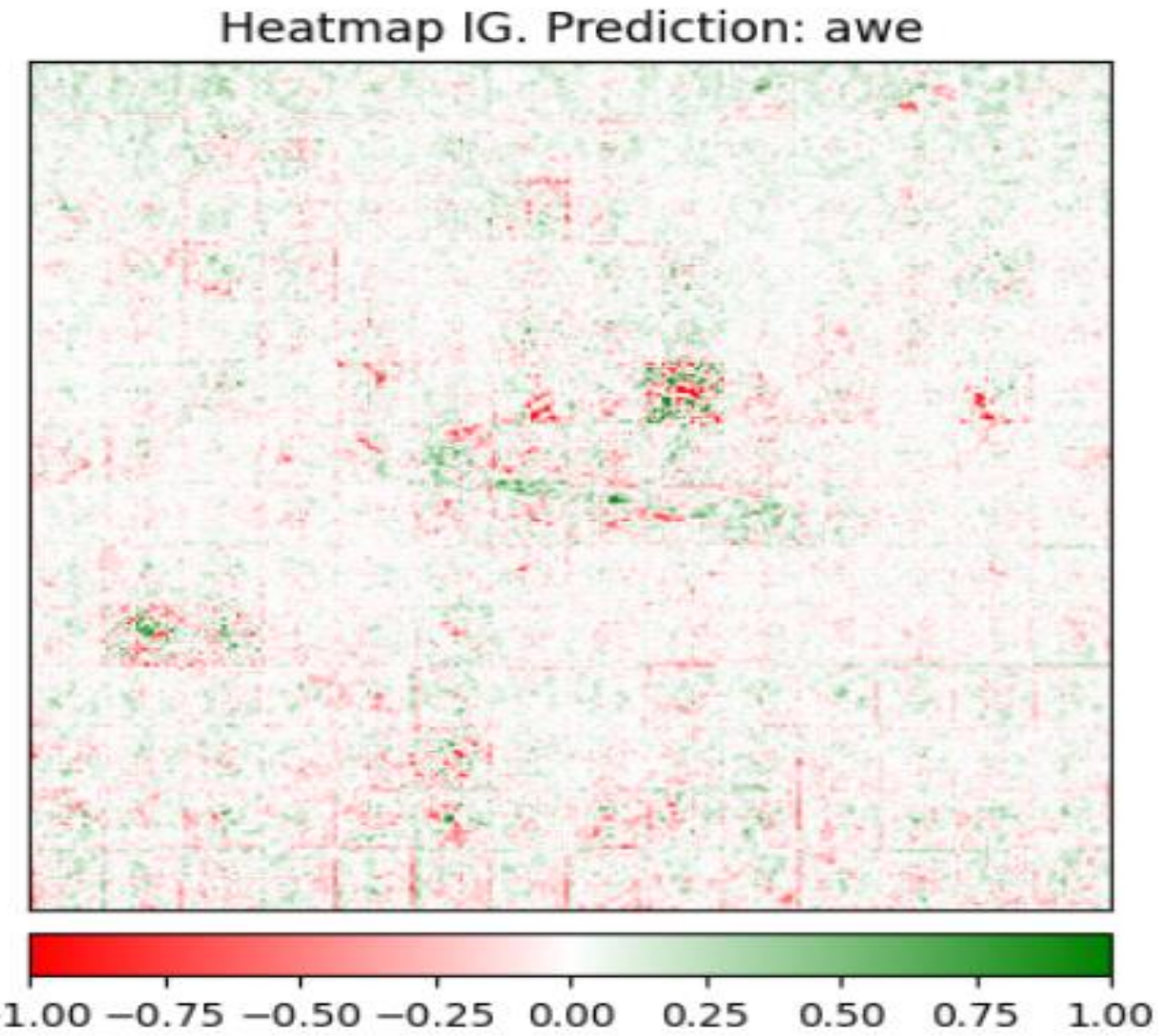
The explanation:




awe
contentment
sadness
fear
amusement
anger
excitement
disgust


awe
contentment
sadness
fear
amusement
anger
excitement
disgust

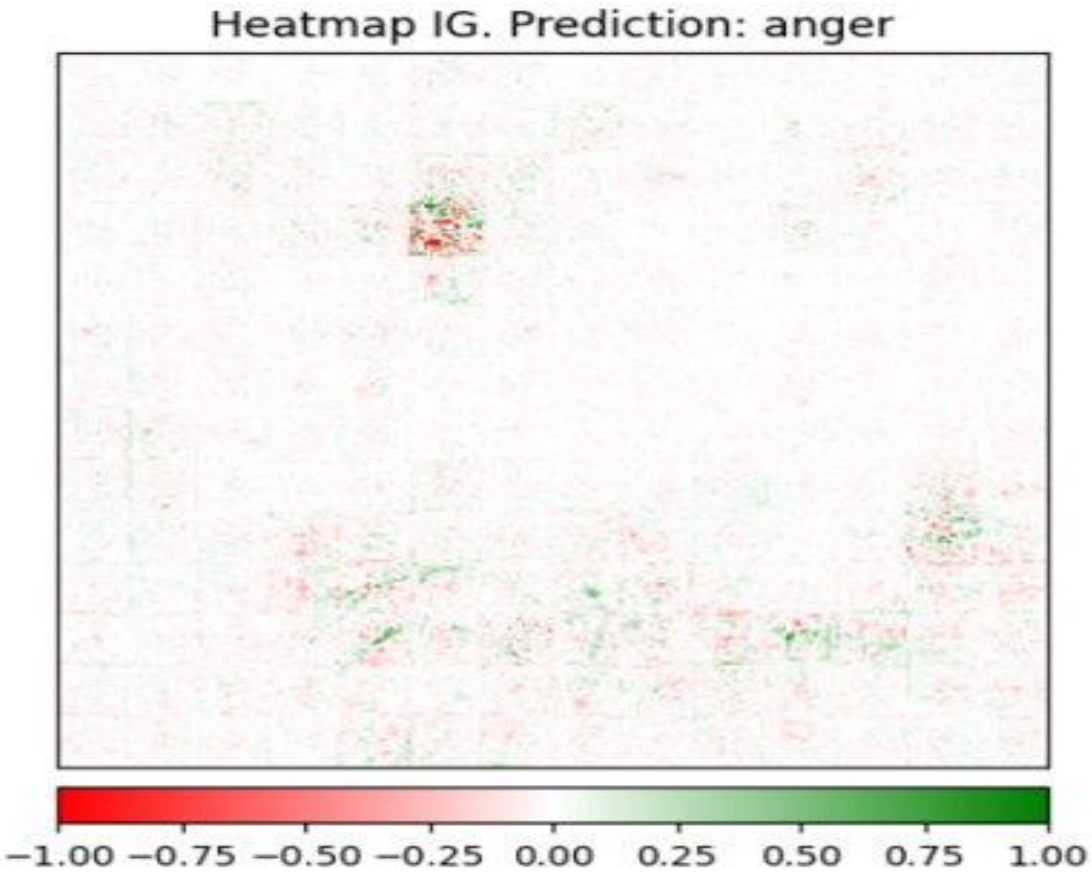
The explanation:



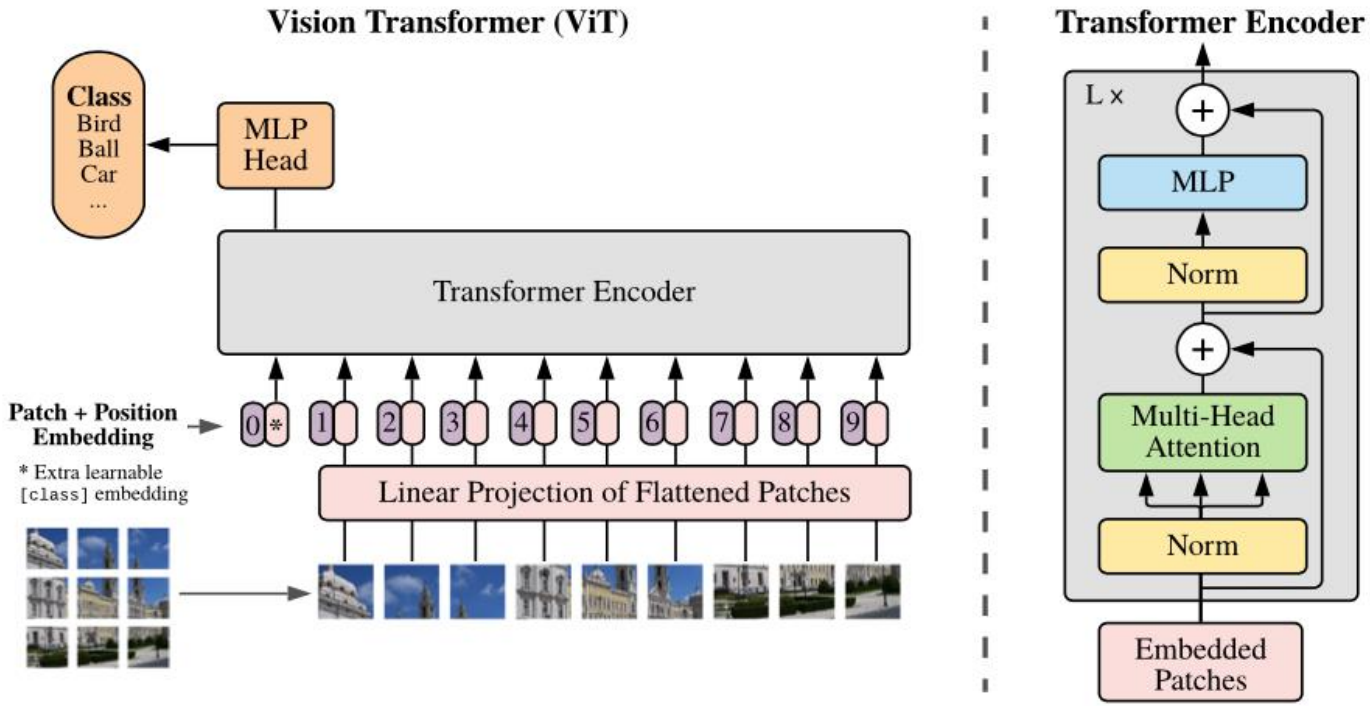
But…


anger
fear
amusement
sadness
awe
excitement
contentment
disgust

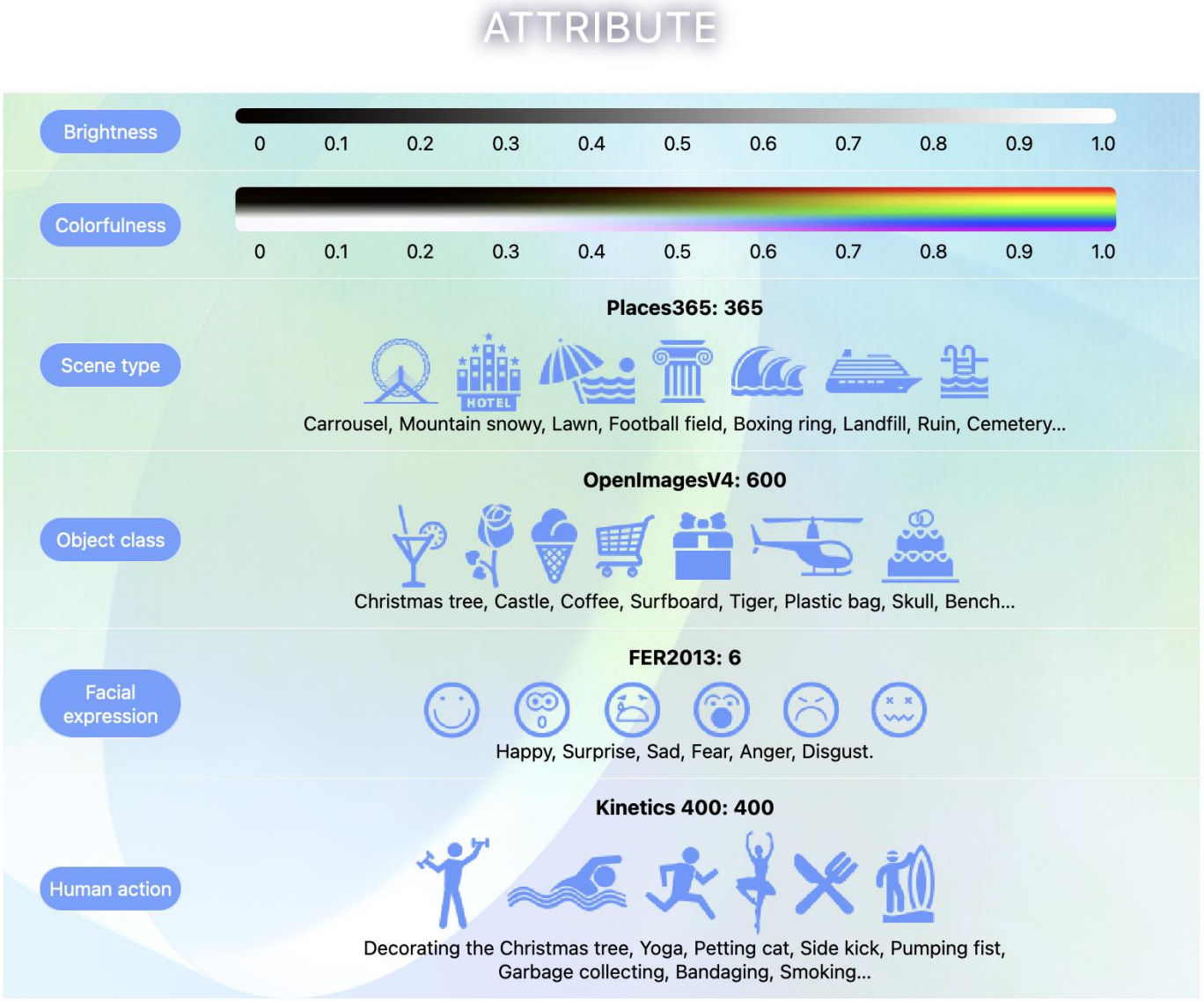
The explanation:



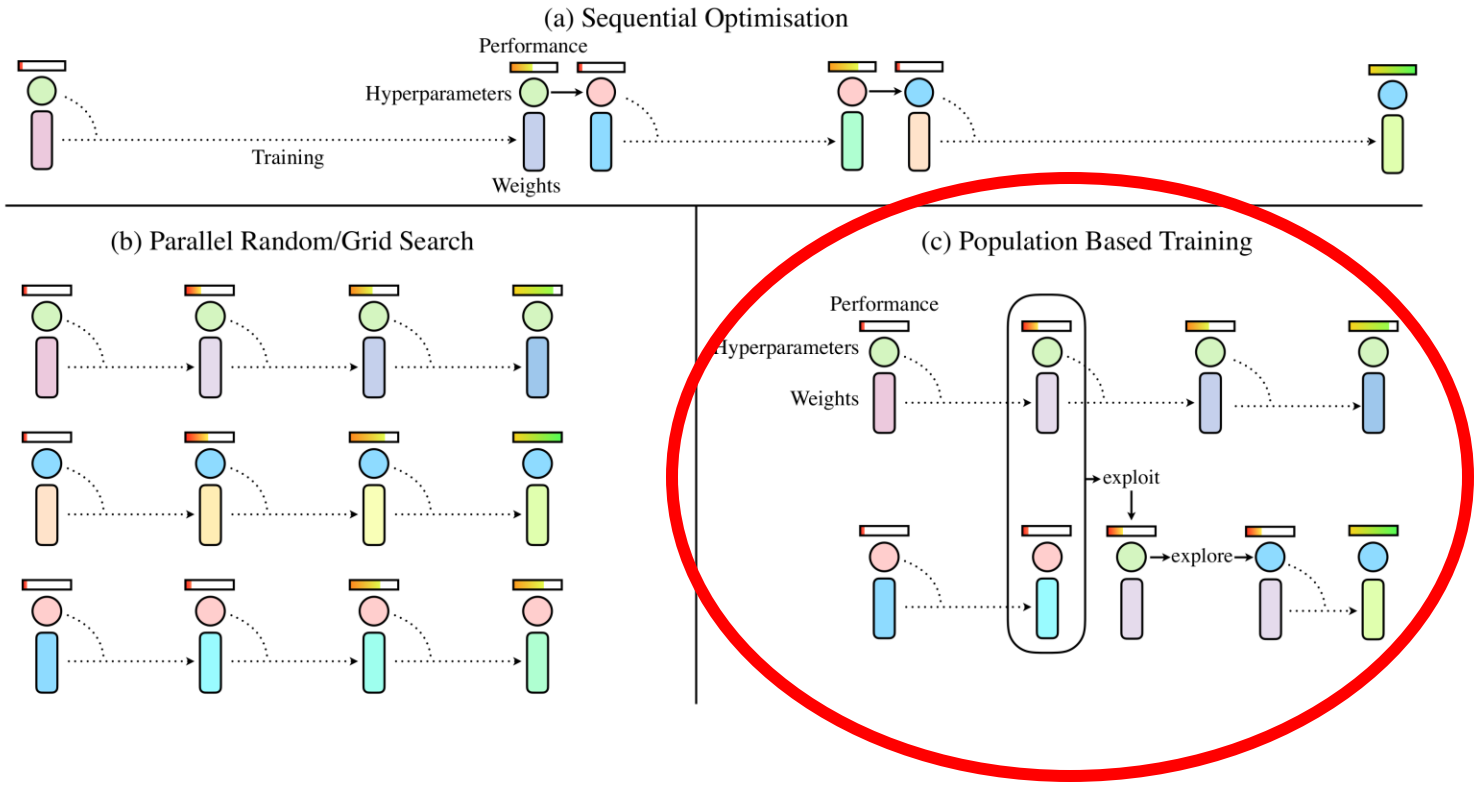
Using Vision Transformers to achieve our goals!



EmoSet: Images with feelings as label.



Hyper Parameter Tuning: Why PBT?



- Faster
- Best results

In many benchmarks

Image processing: How to?

The best practices are employed:

- Normalized!
- With random crops!

The benchmark:

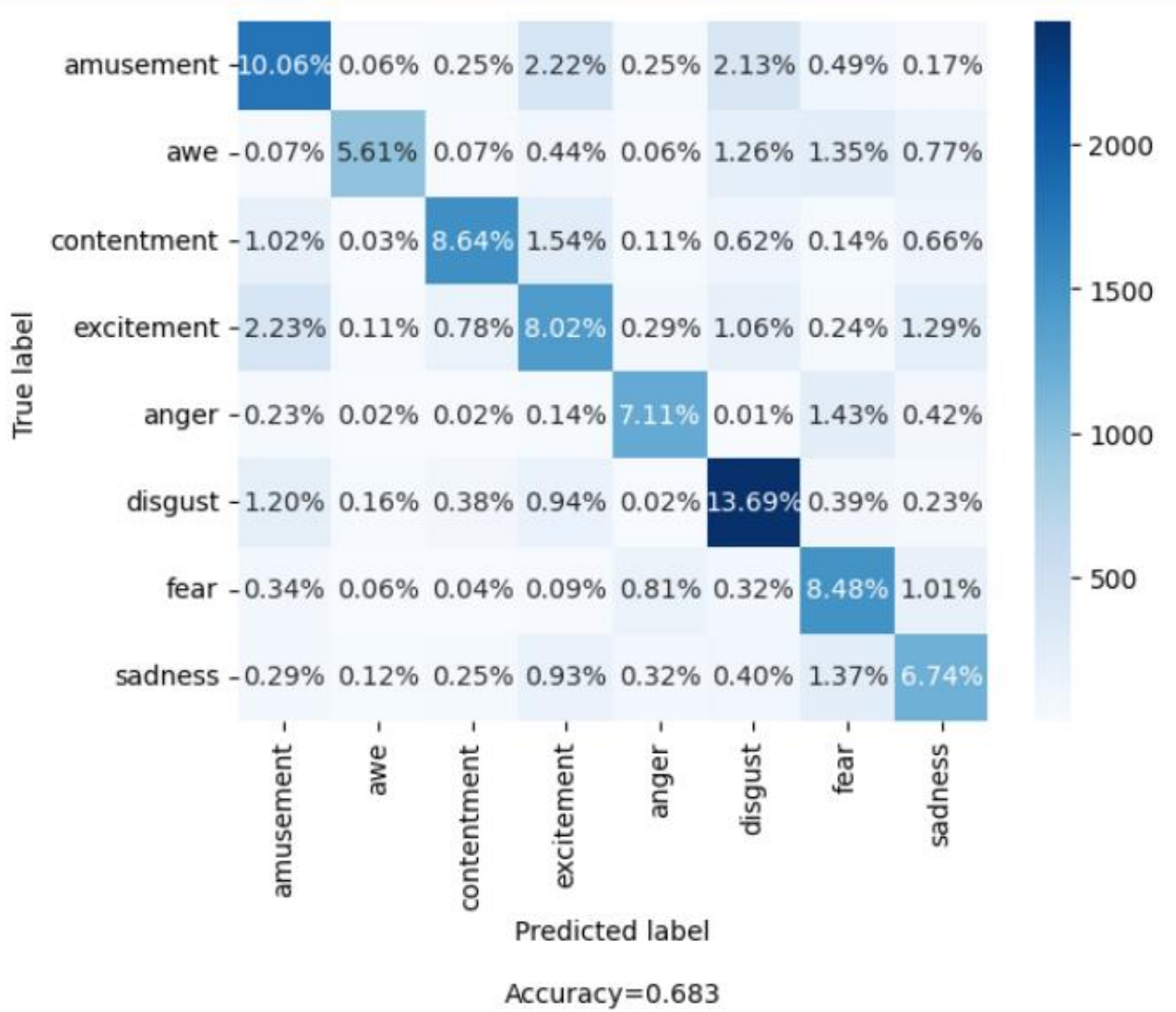
- 78.40 of accuracy

(based on the dataset paper)

Method	Twitter I-2	Twitter II-2	Flickr-2	Instagram-2	Emotion6-6	FI-8	EmoSet-2	EmoSet-8
AlexNet [21]	75.20	75.63	79.73	77.29	44.19	59.85	**89.28**	**67.80**
VGG-16 [43]	78.35	77.31	80.75	78.72	49.75	65.52	**93.40**	**72.27**
ResNet-50 [15]	79.53	78.15	82.73	81.45	52.27	67.53	**93.48**	**74.04**
DenseNet-121 [16]	80.71	78.99	84.87	83.76	53.79	67.24	**92.92**	**72.32**
WSCNet [53]	84.25	81.35	81.36	81.81	58.25	70.07	**94.16**	**76.32**
StyleNet [59]	81.50	80.67	85.02	84.53	59.60	68.85	**93.93**	**77.11**
PDANet [61]	80.71	77.31	85.36	83.80	59.34	68.05	**94.01**	**76.95**
Stimuli-aware [52]	82.28	79.83	85.64	84.90	61.62	72.42	**94.58**	**78.40**
MDAN [48]	80.24	83.05	84.26	83.52	61.66	76.41	**93.71**	**75.75**

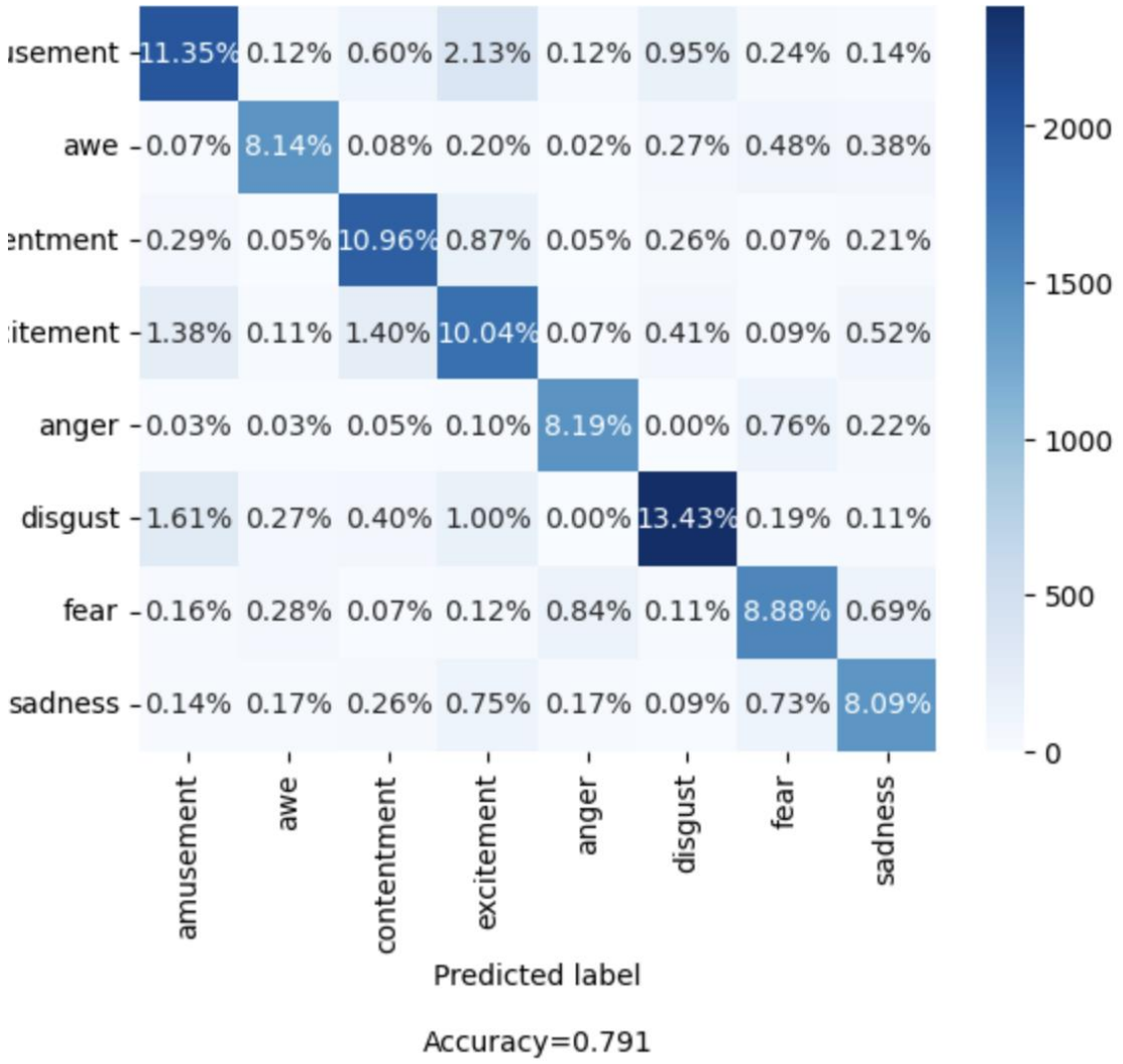
Our first results:

68.3 of accuracy
Without hyperparameter tuning and 1 epoch



Our final results:

79.1 of accuracy
With hyperparameter tuning and 14 epoch
Better than the benchmark of 78.4!



Visual Results:

- 01:26:30 – 01:27:00
- Link

Conclusion – Good ones.

- (Really) good final results related with the best benchmarks.
- Took care about all data processing.
- Learned about more modern techniques of hyper parameter tunnig.
- A deeper understanding about transformers limitation of input data.

Conclusion – Bad Ones.

- After some tries to include categorical data using a multimodal transformer, was decide to focus only on the image data. (More tries?)
- A video transformer could be also a option, but we didn't found any open dataset for this. (Data scriping maybe?)
- Powerfull GPU's are a game changer (and really expensive).
- Trying more transformers architetures (or deep learning in the general) could lead to better final results.

So Long, and Thanks for All the Fish

Wait... That's another project!

Bibliography

- https://vcc.tech/EmoSet
- https://arxiv.org/abs/2010.11929
- https://huggingface.co/docs/transformers/model_doc/vit
- https://docs.ray.io/en/latest/tune/index.html
- https://www.youtube.com/watch?v=YAgjfMR9R_M
- https://www.youtube.com/watch?v=dUzLD91Sj-o
- https://towardsdatascience.com/introducing-transformers-interpret-explainable-ai-for-transformers-890a403a9470