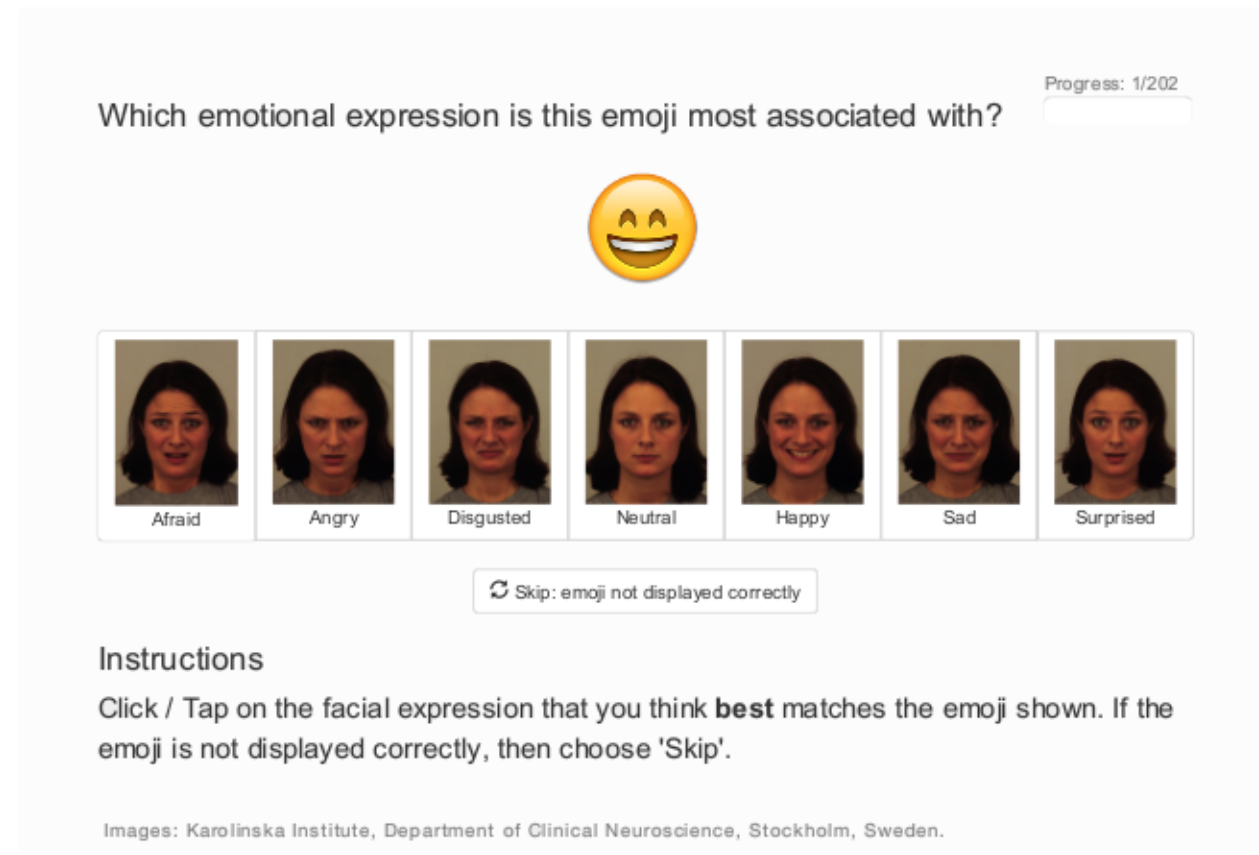


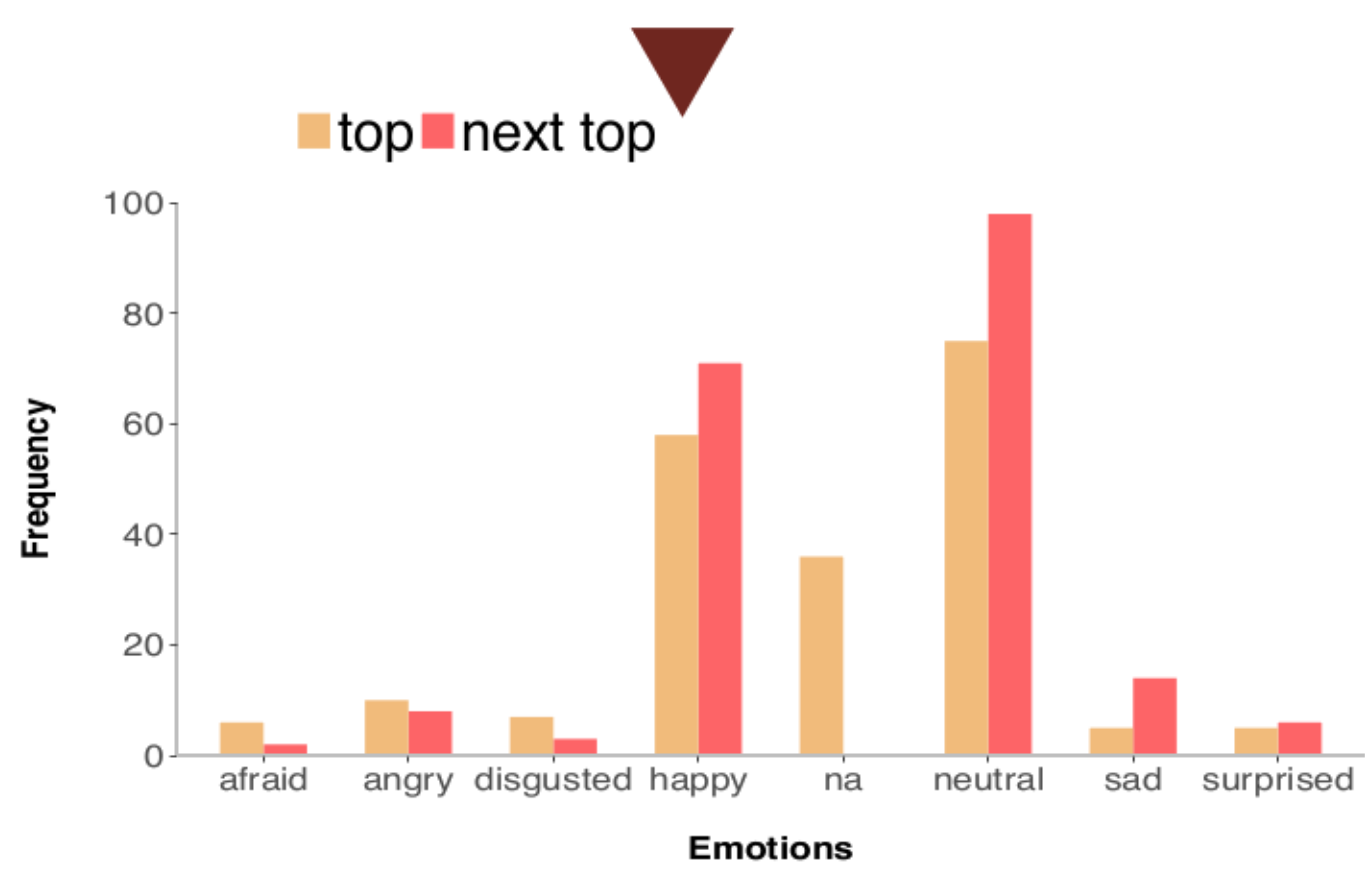
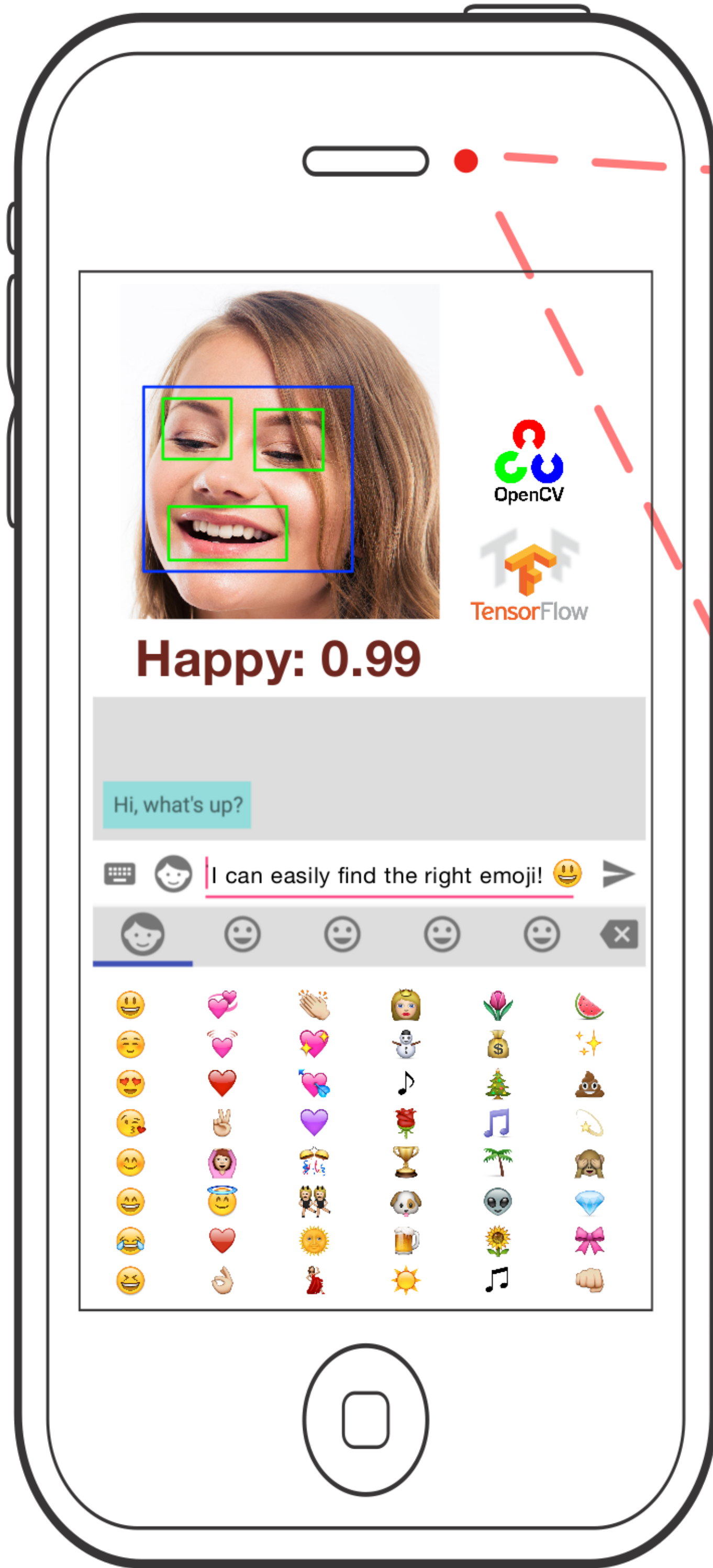


✨ **Abdallah El Ali** ✨, Torben Wallbaum ✨, Merlin Wasmann ✨, Wilko Heuten ✨, Susanne Boll ✨

* University of Oldenburg, † OFFIS



Crowdsourcing 202 common emojis



Mapping emojis to 6 emotions

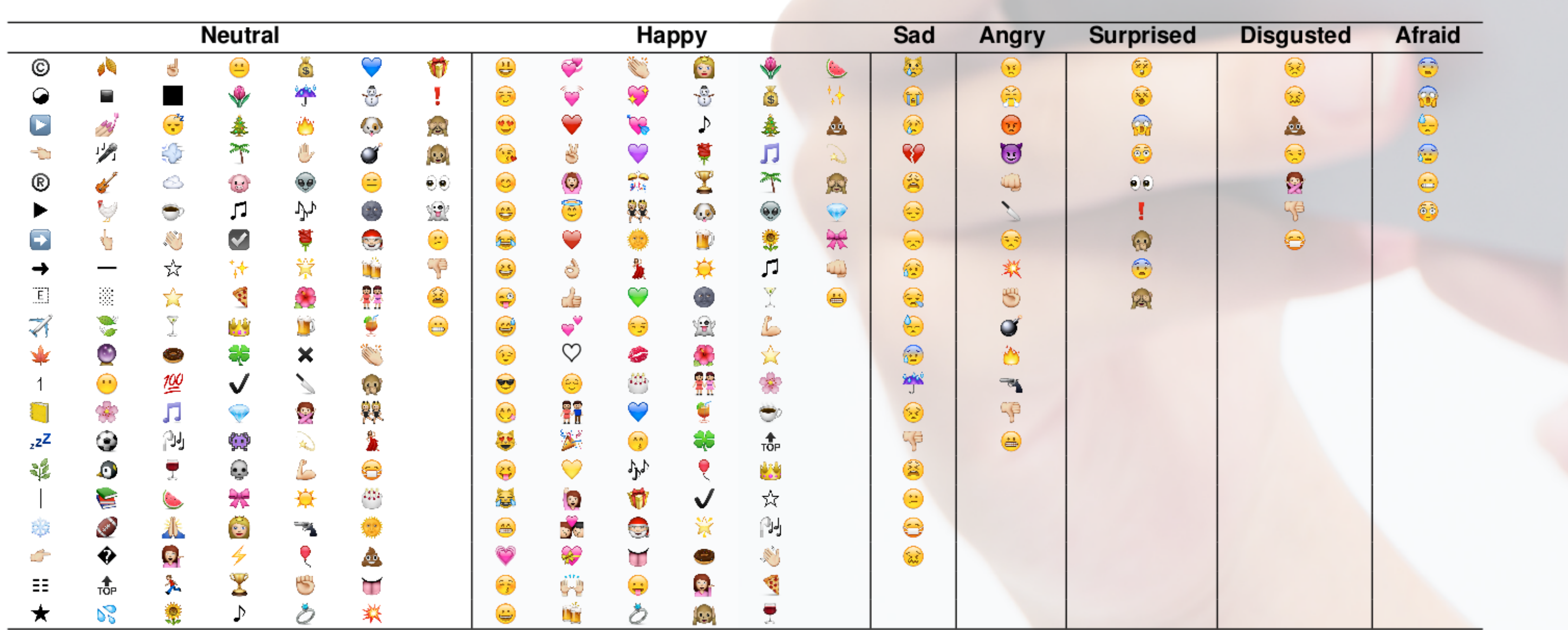
Distribution of top and next top
crowdsourced majority votes of **202 emojis**
across emotion categories, including NAs

To allow for **multiple emotion categories**, we compute **Emotion Class (EC)**:

$$EC = \frac{x_{ij}}{\max(x_i)} = \begin{cases} 1 & \text{if } EC > 0.5 \\ 0 & \text{if } EC \leq 0.5 \end{cases}$$

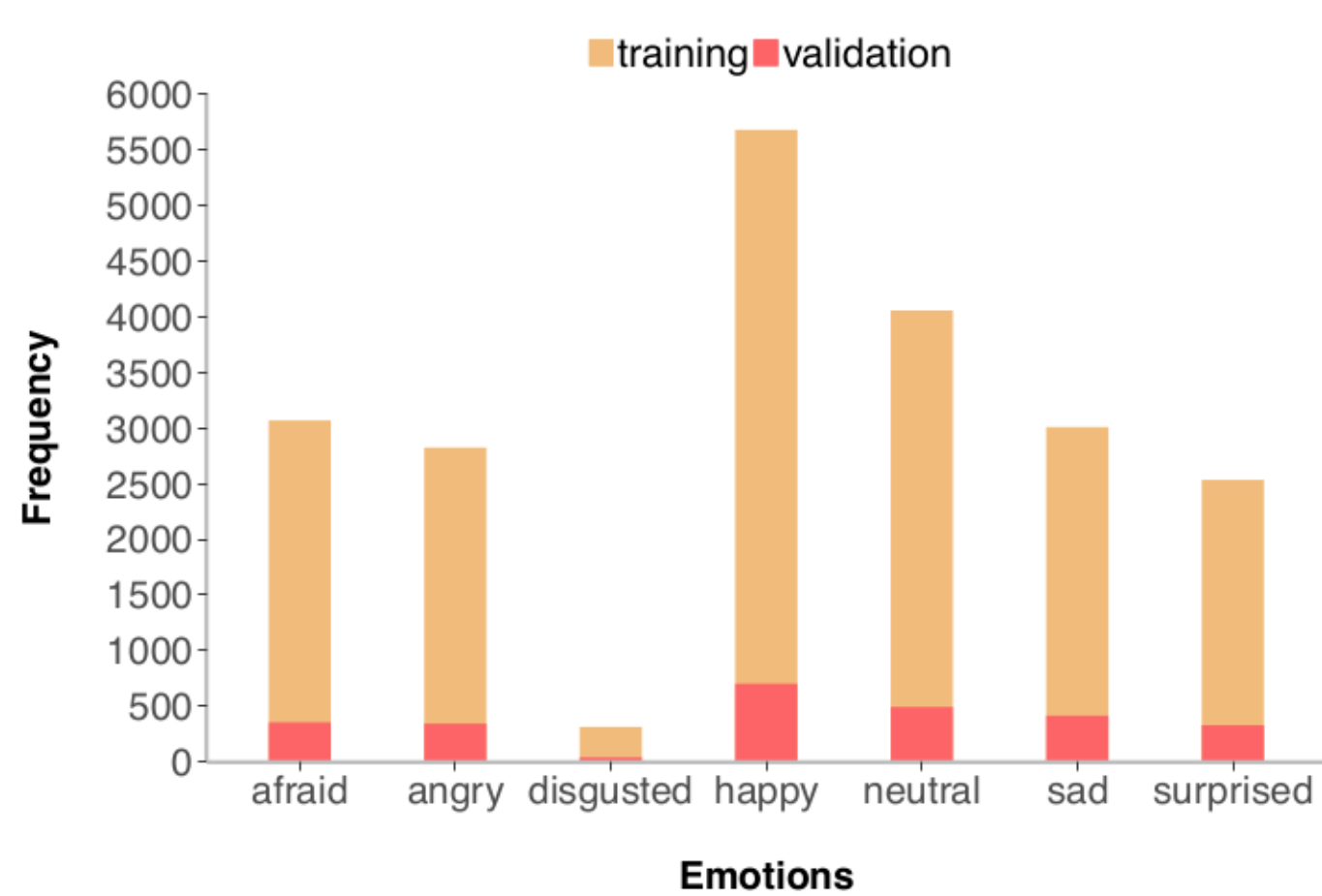
where: $x_i \in [1, 202]$, $x_j \in [1, 8]$

Multi-emotion classification



Resulting emojis per emotion class distribution after applying our EC function.
Get dataset from: https://github.com/abdoelali/f2e_dataset

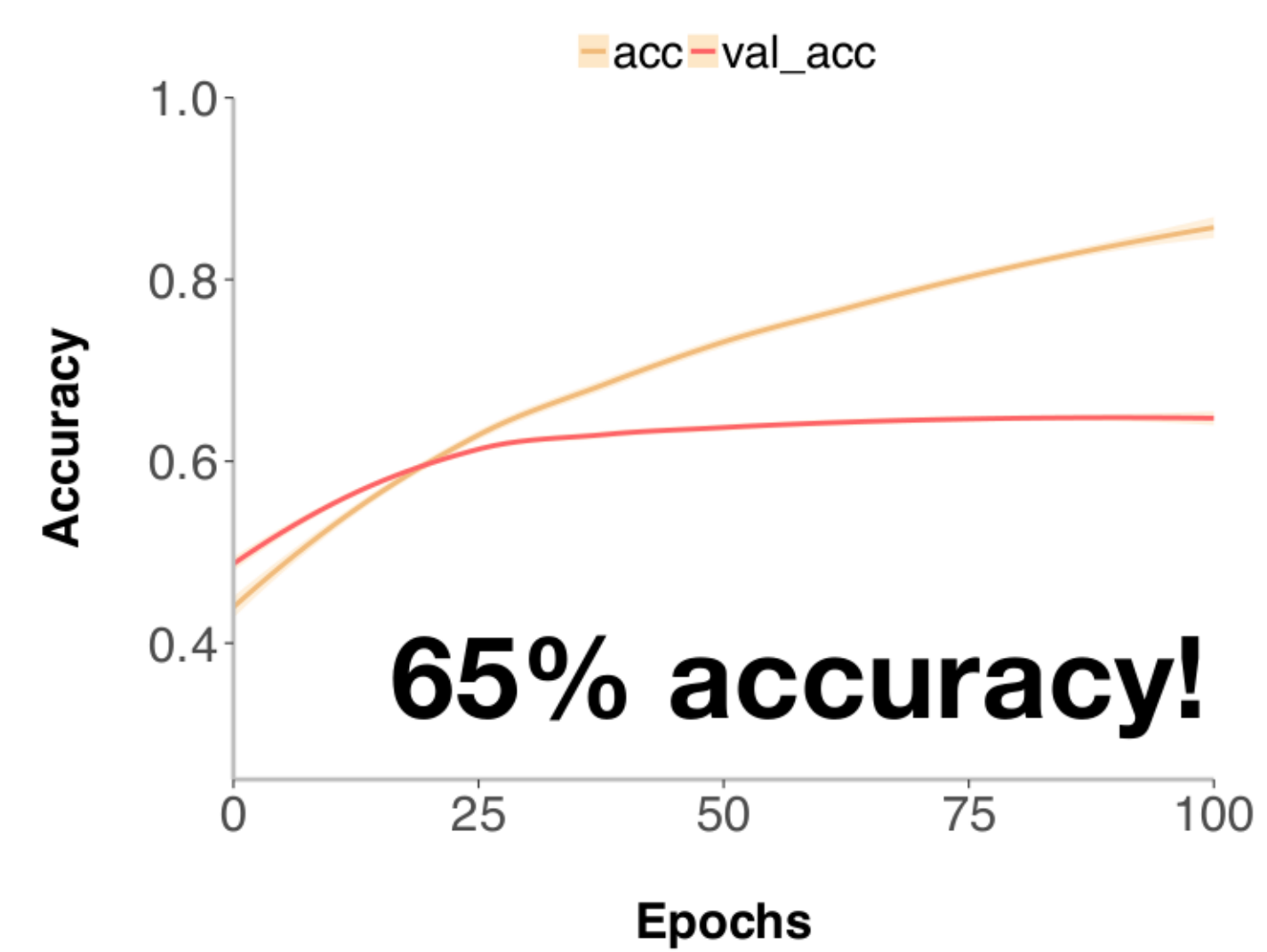
Recognizing the 6 Basic Emotions



Trained deep convolutional neural network (CNN) on **FER-2013 emotion dataset**

Our current CNN architecture

Layer	Output Size
Input	48 x 48 x 1
Convolution	5 x 5 x 64 (activation = ReLU)
Max Pooling	3 x 3 (strides = 2)
Convolution	5 x 5 x 64 (activation = ReLU)
Max Pooling	3 x 3 (strides = 2)
Convolution	4 x 4 x 128 (activation = ReLU)
Dropout	value = 0.3
Fully Connected	3072
Softmax	7



Accuracy and validation of our final network model across 100 epochs

Real Emotion	neutral	0.03	0.01	0.02	0.04	0.10	0.02	0.78
	surprised	0.01	0.01	0.08	0.03	0.03	0.81	0.04
	sad	0.03	0.04	0.05	0.06	0.43	0.04	0.34
	happy	0.01	0.01	0.00	0.86	0.03	0.03	0.07
	fearful	0.11	0.04	0.43	0.01	0.12	0.12	0.17
	disgusted	0.09	0.74	0.03	0.00	0.11	0.00	0.03
	angry	0.46	0.05	0.08	0.03	0.16	0.03	0.20
		angry	disgusted	fearful	happy	sad	surprised	neutral
Predicted Emotion								

Performance matrix for our deep CNN model