

## Supplementary Material (Paper ID: 605)

This supplementary material shows additional Figures that support our arguments in the main paper. The sections follow the same structure as the main paper.

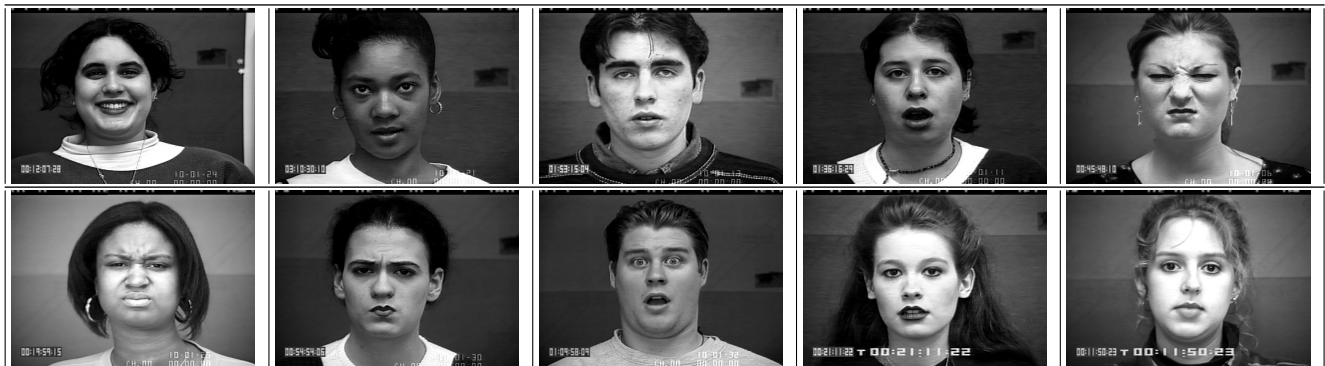
### (1) Introduction

- Main Paper lines: 142 – 146

a)



b)



c)



Figure 2: The differences between our FEEL database when compared with the facial-based approaches for emotion recognition: (a) FEEL database - images annotated with 26 feeling categories and the 3 common continuous dimensions *Valence*, *Arousal* and *Dominance*; (b) CK (Cohn-Kanade) database [21] - composed of frontal face images in gray scale generated in a highly controlled environment. Images are coded according to action units derived from FACS (Facial Action Coding System); (c) EMOTIONET database [3] - composed strictly of face images found using noun and verb relationships for the word *feeling* in WordNet. This is different from CK in that this has color images and the facial expressions are spontaneous. Unlike (b) & (c), FEEL includes the contexts, surroundings and all the nearby objects in the images, thereby enriching it with more information content. *For example:* We can see in (a,1) that the woman is in pain from some suffering and the other woman is trying to sympathize with her. Similarly we can see in (a,5) that an old man is completely engaged in his painting - these kind of information is absent in other datasets (b),(c). FEEL also includes images with faces not clearly visible. *For example:* In (a,2) & (a,3), the faces are obscured, however, their pose, attention, objects they hold and corresponding backgrounds provide information about their feeling.

### (3.1) Image Annotation

- Main Paper lines: 266 – 269

## Task: Image Annotation

NOTE: You are participating in a research study. Your anonymity is assured. The researchers who have requested your participation will not receive any personal information about you. Your participation in this research is voluntary. You may decline further participation, at any time, without adverse consequences.


### Instructions (1/2)

- You will be shown an image with a red bounding box that will focus on a particular person.
- Your task is to think how that person feels given the situation in that image. Observe the whole image, not just the person and his/her face. Think also on how the surroundings affects the person.
- **Now consider each category separately. Look at the person and for each category think whether you see that particular emotion or state in this person or not.**
- And check all the relevant emotions that you think the person is feeling from the list of categories shown.

### Instructions continued ... (2/2)

Example:

When I go through each of the emotion labels, I find that the person looks happy. He is engaged in conversation with people around him. Also, he feels excited to be amongst them. Hence, I should select all these emotions viz. Happiness, Engagement and Excitement. So, annotations like: Surprise, Disapproval or Annoyance would be considered incorrect.

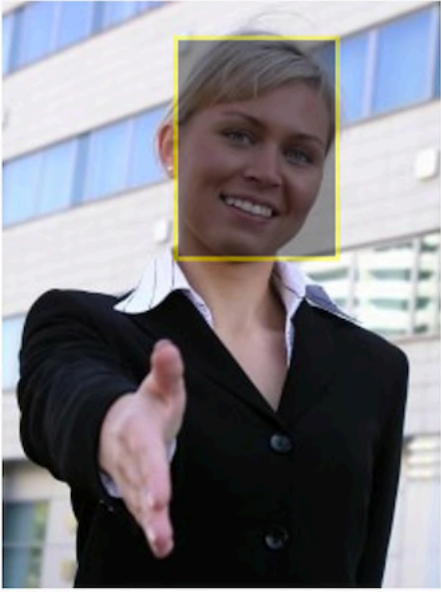


<input type="checkbox"/> Peace (well being and relax)	<input type="checkbox"/> Surprise (sudden discover)
<input type="checkbox"/> Affection (bond feelings/love)	<input type="checkbox"/> Suffering (psychological suffering)
<input type="checkbox"/> Anticipation (state of looking forward)	<input type="checkbox"/> Disapproval (feeling that someone is wrong)
<input type="checkbox"/> Esteem (feelings of favorability)	<input type="checkbox"/> Yearning (strong desire to have something)
<input type="checkbox"/> Confidence (feeling of trust)	<input type="checkbox"/> Fatigue (weariness/tiredness)
<input checked="" type="checkbox"/> Engagement (paying attention)	<input type="checkbox"/> Pain (physical suffering)
<input type="checkbox"/> Pleasure (feeling of delight)	<input type="checkbox"/> Doubt/Confusion (feeling uncertain)
<input checked="" type="checkbox"/> Happiness (feeling of joy)	<input type="checkbox"/> Fear (feeling suspicious or afraid)
<input checked="" type="checkbox"/> Excitement (feeling of enthusiasm)	<input type="checkbox"/> Sensitivity (feeling of being affected)
<input type="checkbox"/> Surprise (sudden discover)	<input type="checkbox"/> Disturbance (surprise)
<input type="checkbox"/> Suffering (psychological suffering)	<input type="checkbox"/> Annoyance (bothered/irritated)
<input type="checkbox"/> Disapproval (feeling that someone is wrong)	<input type="checkbox"/> Anger (intense displeasure)
<input type="checkbox"/> Yearning (strong desire to have something)	<input type="checkbox"/> Disgust (feeling dislike or repulsion)
<input type="checkbox"/> Fatigue (weariness/tiredness)	<input type="checkbox"/> Sadness (feeling unhappy)
<input type="checkbox"/> Pain (physical suffering)	<input type="checkbox"/> Disconnection (not in touch)
<input type="checkbox"/> Doubt/Confusion (feeling uncertain)	<input type="checkbox"/> Embarrassment (feeling ashamed)
<input type="checkbox"/> Fear (feeling suspicious or afraid)	<input type="checkbox"/> Sympathy (state of sharing feelings)
<input type="checkbox"/> Sensitivity (feeling of being affected)	
<input type="checkbox"/> Disturbance (surprise)	
<input type="checkbox"/> Annoyance (bothered/irritated)	
<input type="checkbox"/> Anger (intense displeasure)	
<input type="checkbox"/> Disgust (feeling dislike or repulsion)	
<input type="checkbox"/> Sadness (feeling unhappy)	
<input type="checkbox"/> Disconnection (not in touch)	
<input type="checkbox"/> Embarrassment (feeling ashamed)	
<input type="checkbox"/> Sympathy (state of sharing feelings)	

Figure 3: The instructions on how to attempt the categorical HITs are clearly explained in the interface. It also displays an example of correct and incorrect annotations, which serves as a guide to the workers for demonstrating on how to perform the actual task. We have also included these instructions and the sample example on every page of the actual HIT.

**How is the person feeling?**

What is the person in the red box feeling? You have to consider each category separately. Look at the person and for every category think whether you see that particular emotion or state in that person or not. (Scroll down to refer the instructions and example again)



- Doubt/Confusion** (difficulty to understand or decide/thinking about different options)
- Pain** (physical suffering)
- Anticipation** (state of looking forward/hoping on or getting prepared for possible future events)
- Happiness** (feeling delighted or enjoyment or amusement)
- Disconnection** (not interested in the main event of the surrounding/indifferent/bored/distracted)
- Esteem** (feelings of favorable opinion or judgment/respect/admiration/gratefulness)
- Excitement** (feeling enthusiasm/stimulated/energetic)
- Confidence** (feeling of being certain/encouraged/proud)
- Fear** (feeling suspicious or afraid of danger/threat/evil or pain/horror)
- Anger** (intense displeasure or rage/furious/resentful)
- Affection** (fond feelings/love/tenderness)
- Pleasure** (feeling of delight in the senses)
- Aversion** (feeling disgust or dislike or repulsion/feeling hate or hostile or contempt)
- Sympathy** (state of sharing others' emotions or goals or troubles/supportive/compassionate)
- Embarrassment** (feeling ashamed or guilty)
- Fatigue** (weariness/tiredness/sleepy)
- Disquietment** (nervous/worried/upset/anxious/tensed/pressured)
- Engagement** (paying attention to something/absorbed into something/curious/interested)
- Surprise** (sudden discovery of something unexpected)
- Annoyance** (irritated or bothered by something or someone/frustrated)
- Disapproval** (feeling that something is wrong or reprehensible/contempt/hostile)
- Suffering** (psychological or emotional pain/distressed/anguished)
- Sadness** (feeling unhappy/feeling sorrow/disappointed/discouraged)
- Yearning** (strong desire to have something/jealous/envious/lust)
- Peace** (well being and relaxed/no worry/having positive thoughts or sensations/satisfied)
- Sensitivity** (feeling of being physically or emotionally wounded/feeling delicate or vulnerable)

Back (Image 1 of 20) Go to Next Image

Figure 4: This is what the annotation task looks to the workers. The workers choose the feeling categories that are applicable to the person shown in the particular situation in the image.

### (3.1) Image Annotation

- Main Paper lines: 305 – 308

## Task: Image Annotation

### Instructions (1/2)

- You will be shown an image with a red bounding box that will focus on a particular person.
- Your task is to think how that person feels given the situation in that image. Observe the whole image, not just the person and his/her face. Think also on how the surroundings affect the person.
- ***Now consider each emotional dimension (viz. Valence, Arousal and Dominance) separately. Look at the person and for each of the three dimensions think what level does the person's feelings have on each of the dimensions.***
- Select that appropriate level for each of the dimensions
- Also, select the age and the gender of the person in the red box.

Figure 5: The instructions for the Continuous HIT task are clearly mentioned in the interface.

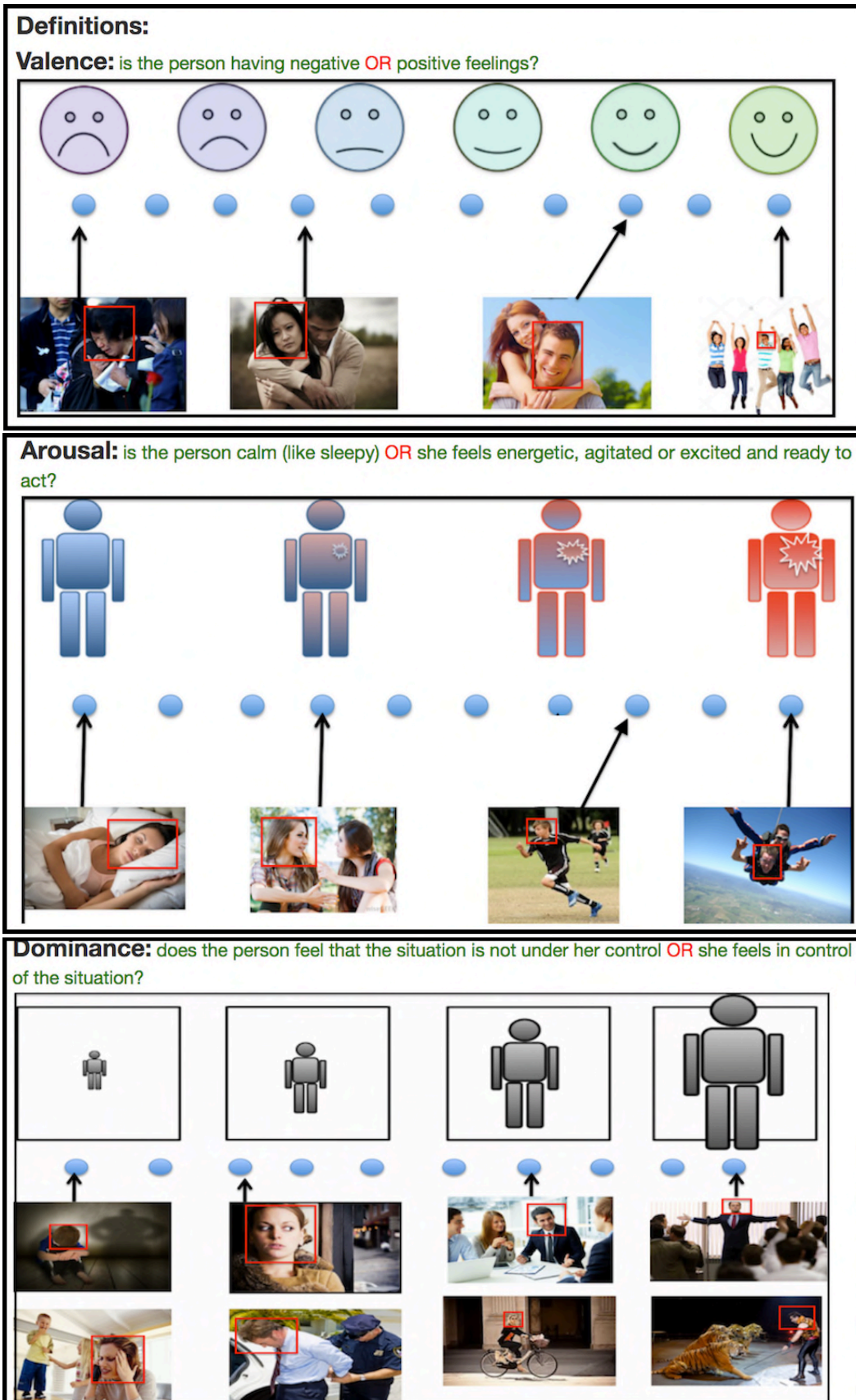


Figure 6: We define the 3 different dimensions for the workers in order to help the workers get the basic idea by showing examples. For each dimension, there is a representative image for a particular score. This helps to get acquainted of what the scores of each dimension mean.

**Example:**

- We have to label each of the three emotional dimensions for this person.
- First, we observe the picture: the person is hugging a dog, she looks happy and relaxed. The dog is quiet and seems to enjoy this hugging as well. The environment looks quiet, we can see some vegetation and we notice it is sunny, the weather looks nice.
- Now let us analyze each one of the emotional dimensions:
  1. **Valence** (*is the person having positive OR negative feelings?*): In this case (image below), she seems to be experiencing a positive emotion. So, her valence emotional level is positive. If we can imagine situations where a person could experience even higher positive emotion we should rate this dimension with a high score, but not with the highest possible.
  2. **Arousal** (*is the person calm (like sleepy) OR she feels energetic, agitated or excited and ready to act?*): In this case (image below), She seems relaxed and quiet, her body pose indicates that she is not too active, so her arousal scale is towards calm. We can imagine, however, situations where a person can feel even more calm (for instance someone almost sleeping in the sofa). For this reason we score this dimension towards calm, but not the most calm possible.
  3. **Dominance** (*does the person feel that the situation is not under her control OR she feels in control of the situation?*): In this case (image below), the situation is not threatening at all, so the person seems to be in control. So, in the dominance scale, her emotional state suggests a high level of control of the situation.
- Also select the appropriate age and the gender of the person in red box.

**Valence: *Negative vs. Positive***

Negative (unpleasant)             Positive (pleasant)

**Arousal (awakeness): *Calm vs. Ready to act***

Calm       Ready to act (active)

**Dominance: *Dominated vs. In control***

Dominated (no control)       In control

Back Next Image (Image 1 of 20)

**incorrect**

**Gender and age of person in red box:**

Male  Female

Kid (0 - 12)  Teenager (13 - 20)  Adult (more than 20)

Hence,

The screenshot shows an annotation interface for a photograph of a woman hugging a dog. A red box highlights the woman's face. The interface consists of three scales and a demographic section:

- Valence: *Negative vs. Positive***  
Scale: Negative (unpleasant) [sad face] [neutral face] [happy face] Positive (pleasant) [very happy face]. The 4th option (happy face) is selected.
- Arousal (awakeness): *Calm vs. Ready to act***  
Scale: Calm [blue figure] [medium blue figure] [red figure] [red figure with lightning bolt] Ready to act (active). The 3rd option (red figure) is selected.
- Dominance: *Dominated vs. In control***  
Scale: Dominated (no control) [small figure] [medium figure] [medium-large figure] [large figure] In control. The 3rd option (medium-large figure) is selected.
- Gender and age of person in red box:**  
Gender:  Male  Female  
Age:  Kid (0 - 12)  Teenage (13 - 20)  Adult (more than 20)

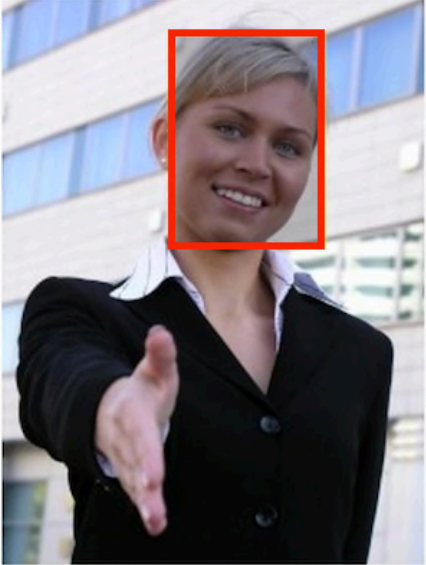
Buttons: Back, Next Image, (Image 1 of 20), Correct

Figure 7: Showing the workers an example of how to annotate, meanwhile, explaining each step and giving reasons for selecting a particular score over other scores. We also give example of incorrect annotation to show that such instances are not good annotations. This is supposed to help them decide the score level while annotation. For this reason, we also include these instructions and examples at each person annotation.



**How is the person feeling?**







Select the appropriate level of each dimension (viz. Valence, Arousal and Dominance) which shows the emotional state of the person in red box. **You have to consider each emotional dimension separately. Look at the person and for each of the three dimensions think what level does the person's feelings have on each of the dimensions. And select the level accordingly**







Back   Next Image

**(Image 1 of 20)**





**Valence: *Negative vs. Positive***

Negative (unpleasant)       Positive (pleasant)

**Arousal (awakeness): *Calm vs. Ready to act***

Calm     Ready to act (active)

**Dominance: *Dominated vs. In control***

Dominated (no control)     In control

**Gender and age of person in red box:**

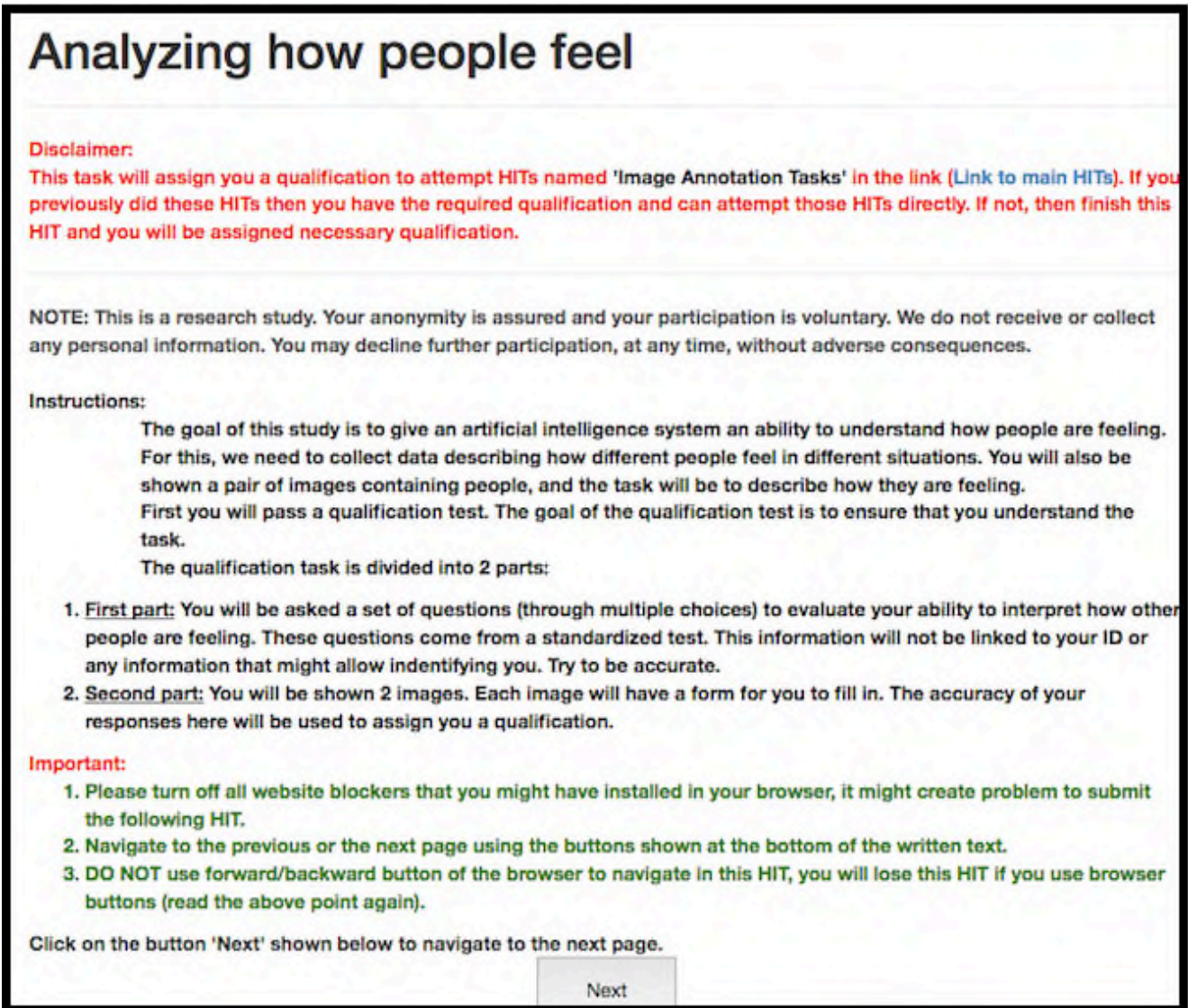
Male    Female

Kid (0 - 12)    Teenager (13 - 20)    Adult (more than 20)

Figure 8: In the interface, the workers are shown all the 3 dimensions with the level of scores and asked to select appropriate level according to the person in the bounding box. We also ask the workers to estimate the gender and the age of the person in the bounding box

### (3.1) Image Annotation

- Main Paper lines: 313 – 315



**Analyzing how people feel**

**Disclaimer:**  
This task will assign you a qualification to attempt HITs named 'Image Annotation Tasks' in the link ([Link to main HITs](#)). If you previously did these HITs then you have the required qualification and can attempt those HITs directly. If not, then finish this HIT and you will be assigned necessary qualification.

**NOTE:** This is a research study. Your anonymity is assured and your participation is voluntary. We do not receive or collect any personal information. You may decline further participation, at any time, without adverse consequences.

**Instructions:**  
The goal of this study is to give an artificial intelligence system an ability to understand how people are feeling. For this, we need to collect data describing how different people feel in different situations. You will also be shown a pair of images containing people, and the task will be to describe how they are feeling. First you will pass a qualification test. The goal of the qualification test is to ensure that you understand the task.  
The qualification task is divided into 2 parts:

1. **First part:** You will be asked a set of questions (through multiple choices) to evaluate your ability to interpret how other people are feeling. These questions come from a standardized test. This information will not be linked to your ID or any information that might allow indentifying you. Try to be accurate.
2. **Second part:** You will be shown 2 images. Each image will have a form for you to fill in. The accuracy of your responses here will be used to assign you a qualification.

**Important:**

1. Please turn off all website blockers that you might have installed in your browser, it might create problem to submit the following HIT.
2. Navigate to the previous or the next page using the buttons shown at the bottom of the written text.
3. **DO NOT** use forward/backward button of the browser to navigate in this HIT, you will lose this HIT if you use browser buttons (read the above point again).

Click on the button 'Next' shown below to navigate to the next page.

Next

Figure 9: The first page of the EQ task containing an exhaustive and clear instructions and information. This helps the worker to get informed about the tasks ahead.

## Task: General Questions

Please, read the sentence carefully and select your level of agreement or disagreement from the 4 choices.

**What is your Gender?**

Male  Female

**1. I can easily tell if someone else wants to enter a conversation**

Definitely Agree  Slightly Agree  Slightly Disagree  Definitely Disagree

**2. I find it difficult to explain to others things that I understand easily, when they don't understand it first time**

Definitely Agree  Slightly Agree  Slightly Disagree  Definitely Disagree

**3. I really enjoy caring for other people**

Definitely Agree  Slightly Agree  Slightly Disagree  Definitely Disagree

**4. I find it hard to know what to do in a social situation**

Figure 10: Snapshot of the standard questions asked to the workers to attempt [11]. These questions are very general in nature asking about certain situations a person might face in real life and the decisions, thereby, he/she takes. These decisions (or responses) help us estimate the empathizing quotient

**19. Snow is white in color**

Definitely Agree  Slightly Agree  Slightly Disagree  Definitely Disagree

**25. When you take two apples in left hand and three apples in right hand, in total you have five apples**

Definitely Agree  Slightly Agree  Slightly Disagree  Definitely Disagree

Figure 11: We also inserted 2 control questions in the interface so that the worker does not attempt the questions randomly. These control questions are simple, clear and have a standard response. If the control questions are not correct then we present the worker with the warning message.

### (3.2) Database Statistics

- Main Paper lines: 416 – 419

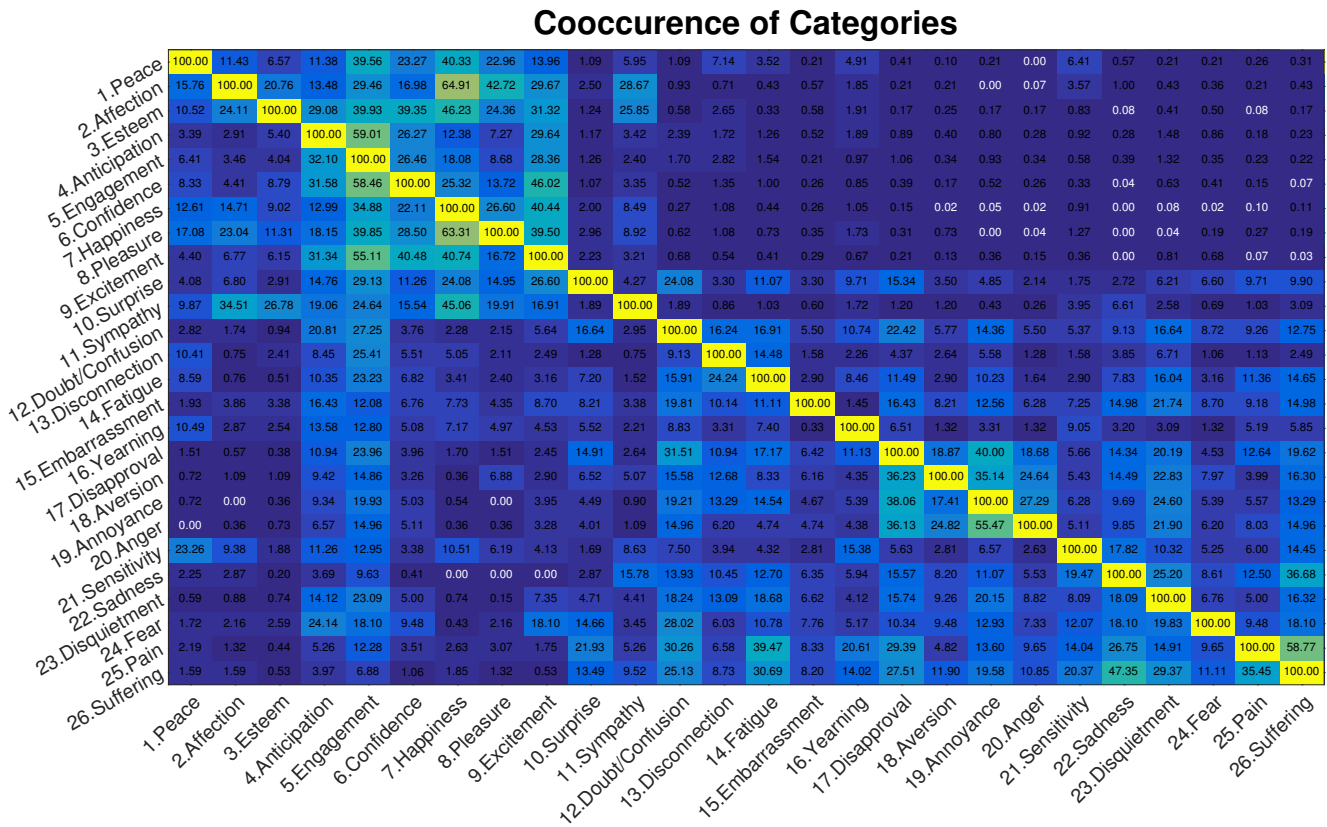


Figure 12: Co-occurrence of Categories. Each row represents one feeling category. For each row, the column values represent the percentage of persons that are also annotated by the corresponding category of the column. **Example.** (7).Happiness has a huge overlap (65%) with row of (2).Affection, meaning that for all persons annotated with (2).Affection, 65% of them have been annotated with (7).Happiness as well.

### (3.2) Database Statistics

- Main Paper lines: 476 – 478

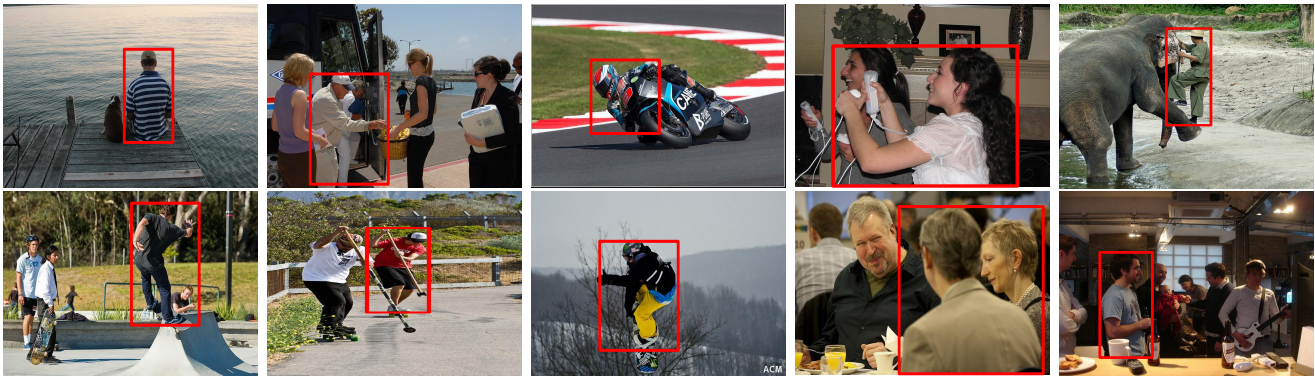


Figure 13: A sample set of images from our FEEL Database, which shows the variety of images where the person's face is obscured for various reasons. However, using contexts like pose, scene category, surrounding people's reactions and other object categories, it is easy to infer the feeling of the person.