Identifying emotions and having a way to annotate these emotions is a great start to closing the gap between artificial intelligence and humans. Emotion analysis has been a major research topic for the past 3-4 decades therefore there are lots of tools available for emotion identification but tools for annotating these identified emotions are lacking. Most existing emotion annotation tools have been designed to help researchers develop emotion databases and machine learning models. Therefore, not much thought has been given to the development of these tools as they have been designed as helping tools for other research topics. Many annotation tools available require manual annotation of data which bring in the annotator’s personal bias into the annotation and they focus mainly on text-based emotion whereas our focus is speech emotion annotation.

Since the beginning of emotion analysis research various psychological models of emotions have been developed. The goal of many emotional modals available is the assumption that emotions are normally triggered by external stimuli and events. To verify theses assumptions relevant detectors are required and after this we need to analyse these gathered signals and annotate them in a readable medium which is an important aspect when it comes to the topic of emotion. A few emotion models that keep getting used in the field of emotion and HCI are Russell’s model and Ekman’s model. These 2 emotion models have 2 different approaches when it comes to emotion categorising. Ekman uses 6 discrete emotional states and Russell uses a valence–arousal plot to represent different emotional states.

Some emotions are challenging when it comes to putting in a certain category therefore most modern research tend to use the dimensional approach which is the ‘Russell’s model’ over the categorical ‘Ekman’s model ‘where there are only 6 emotion categories.

Different annotation tools use different bio signals to extract emotions and sometimes some tools utilise more than one bio signal to make the analysis process better. Sight, speech, EEG (brain stimuli), facial expressions, electrodermal signals, temperature and blood volume pulse are some main bio signals that gets used often in emotion analysis/annotation tools.

EmotionGUI is a tool that is used to visualise and annotate emotion invoked by speech (multi modal) in a 2D environment. It is a tool that aid the creation of emotion- annotated databases that help in training deep learning algorithms. The tool uses the Russell’s circumplex valence-arousal model for the annotation of emotion in a real time environment.

Emotion-prints uses EEG signals to annotate emotions in real time on a Russell’s circumplex valence-arousal plot. It was developed to aid the evaluation of touch applications using emotion visualisation.

DANTE is a WEB based tool that uses AHMUSE which is a dataset for humour sensing. The focus of this research was the dataset whereas the tool was an aiding tool for this dataset annotation. Tools like FeelTrace, GTrace was tested when developing DANTE but was excluded due to their installation process (having to download the application to the users’ local device). But AFEW-VA and ANNEMO was a tool they considered with their development. Drawbacks noticed with the research of these tools include :

* Frame by frame annotation of video clips on a valence-arousal plot which introduces bias that is a result user concentration (AFEW-VA)
* And bias introduced with the training received by the user or the experience user had with the tool (AFEW-VA)
* UI-reasons and administration reasons (ANNEMO)

VAOAT

Ideas(from last week):

* What, Why, How format
* Table columns into paragraphs
* 3rd person pov
* Citation
* Justification of the doc
* Motivation for the tool (eg for database, analysis)

**Research on Emotion annotation models**

In my research I came to know that there are 2 different categories of emotional models.

1. Categorical – Defines a set of emotional categories.
2. Dimensional – Quantitative measurements using multi-dimensional scales.

Emotional GUI used dimensional models but still incorporates categories by helping the user figure out where main emotions like sadness/happiness fall on the scale. Our focus for this research should be to improve the way these models are presented to the user and make the annotation process smooth. There are different ways to represent the annotated emotion and we are using a 2D representation called ‘Valence-Arousal’.

FEELTRACE is a tool that I found to be very similar in technique to EmotionGUI.

VAOAT Tool was used to populate a database.

DANTE is a web-based tool but otherwise the functionality is quite similar to EmotionGUI.

JERI is a continuous annotation tool that uses a joystick to help with annotation.

**Research on Evaluation of these tools**

There are different UX techniques used when analysing an emotion annotation tool. While some are effective for the given annotation tool some are not as those techniques are more suitable for emotion annotation that is not done via speech. The research paper ‘Inter-Rater Agreement and Usability: A Comparative Evaluation of Annotation Tools for Sentiment Annotation’ focus on evaluating different UX techniques for tool analysis but this is done for emotion recognition from text. But nonetheless these techniques can be adapted to speech emotions by recognizing what they are trying to evaluate with each technique.

Anther common theme talked about in these papers were how to extinguish the person bias brought in by the annotators. This is something I also thought of as different people would view the same emotion type in different ways given the time of the day, their current mood etc.

A common term I came across when searching about evaluations is ‘Inter rater agreement’.

(haven’t looked into this yet)

**Research on other bio signals other than speech to annotate emotions.**

Most new research tends to integrate more than one bio signal to the emotional recognition section as this makes the emotion analysing process much better.