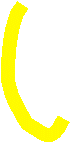
FeelTrace [12] is one of the earliest and most well-known continuous dimensional tools developed in the late 1990s. The tool allows annotators to trace the emotional content of an audio-visual stimulus on a two-dimensional circular space of activation and evaluation as they perceive it over time. The major problems this study addressed for analysing the emotional content of a spontaneous speech were gradation and variation of emotion states over time. Two approaches are presented and implemented by the study [12] to deal with mixtures of emotions whose states are spontaneously changing; moreover, the shift is unexpected. The first measure was taken by introducing a colour-coded cursor derived from Plutchik’s emotional index, shown in Figure 1, which offers an intuitive way for users to associate with the relevant emotional state. ~~Intermediate ratings of emotions follow the additive rule to depict their positions on the 2D plane~~ [12]. A set of key emotional words selected initially to act as verbal landmarks raised a concern of having inconsistent recordings between raters to a critical extent. Thus, the reselection of landmarks was carried out based on the rater’s responses to specific representations in the space. Referring to tables published by Whissell[12-4], landmarks are placed in the 2D space, which helps users readily associate position with everyday discrete descriptions of emotions. Also, having the landmark encourages calibration of users’ responses with respect to those found to be most natural by people on average. The last measure is applied to take account of the representation of time dimension by gradually shrinking the circle pointer indicating the current mouse position in the space over time. Other features implemented in the tool, such as an induction procedure to offer tutorials and to exclude a rater creating a bias and integrated presentation of a video player and the annotation space on a single screen, contribute to the improvement of the tool. All these features presented above heavily influence the tools developed after FEELTrace, especially GTrace, VAOAT and EmotionGui.



GTrace [26] published in 2012 as a FEELTrace successor system, is a continuous one-dimensional tool, which traces responses by moving a mouse cursor along two separate sliders, each representing valence and arousal scales. Key features from FEELTrace, such as colour-coding and circle pointer getting smaller in size with respect to time, are directly adopted into the tool. This tool not only employs one-dimensional space to alleviate cognitive load caused in 2D bipolar space for recording; but also considers a case where users want to work on emotional scales other than valence and activation by providing users with various sets of emotional terms, including discrete descriptions of Ekman’s six basic emotions, “Everyday” dimensional scales by Fontaine et al [26-6] and other scales derived from EmotionML vocabularies. This tool certainly offers an alternative to FEELTrace, which was limited to WindowsXP with codes developed over a decade ago. A tool released a year later called ‘ANNEMO’ [25], introduces a web-based version of GTrace to facilitate remote annotation, allowing users to log into their account with a unique identifier in the web interface. The features corresponding to time progression and customisable emotional dimension are excluded in this tool; however, additional new features were implemented, such as the post-processing of annotations to minimize changeability in data using normalization techniques. This enables the annotation of social dimensions as well. A list of annotated data on the left panel makes the dataset easily accessible to users, which in turn, improves usability. VAOAT [32], created to annotate AFEW-VA database, is also a web-based application and functions in a similar way to ANNEMO, allowing multiple users to mark two affective dimensions of valence and arousal separately using a slider, except that the annotations on video clips are produced frame by frame. This change is implemented to avoid delays between the marking and the video [22]. It also has new features to add comments and mark annotations as ‘done’ or ‘to be checked’ for reannotation to be done later when users have doubted the accuracy of annotation due to lacking concentration or sensitivity of the slider or joystick used [22]. These new features result in highly accurate annotations for this tool, yet, a limitation still remains in handling discrete emotions. Both ANNEMO and VAOAT contribute to the development of DANTE, which is an intuitive, effective web-based tool for annotating emotions in valence and arousal dimensions continuously, one at a time. This tool has been modified by adopting a pictorial representation of emotional scale along the slider using AffectButton, which resulted in intuitive labelling and prior training no longer being required. As noticed from VAOAT’s per-frame annotation, a bias lead to sharp annotation signals that conflict with the dynamic expression. Thus, DANTE changes its scheme back to continuous annotation.



Like Dante, other annotation tools named EMuJoy [] and JERI [20] also add visual guides in the interface using SAM [11], and annotations are implemented on a two-dimensional framework of valence and arousal using joysticks.



Carma [] and its derivative ‘Darma’ [] have a distinctive feature from other tools, which is an additional window for viewing previously collected measurements alongside an original media file. Darma, furthermore, has the ability to auto-synchronise media playback with a collection of ratings and supports multiple annotators’ ratings to be displayed on the 2d polar plane superimposed to one another. In addition, it offers various rating analysis options for estimating descriptive statistical results such as the mean of multiple annotator’s measurements, inter-rater agreement and reliability etc., each of which can be plotted with respect to time. These features offered by Carma and Darma contribute to the improvement of efficiency, training and quality control of research tasks.

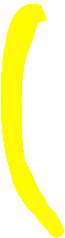


Darma, with all of its essential features such as playback-measurements auto-synchronization, annotation review tools and easy customization, makes itself surpass all existing 2D systems.

Measurements made on 1D at a time -2D simultaneously; many research areas are primarily interested in collection 2D measurements. The intersections of 2d measurements allows for much richer descriptions than either dimension could provide alone, as they provide coverage of interstital space defied by blends of two dimensions. As such, a feature-rich software package for collecting 2D/circumplex rating is needed.

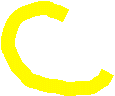
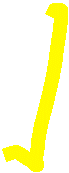


* Customized to collect measurements of any kind; adapted to nearly any project for which continuous ratings are desired , allowing raters to resport on experiences of other emotional dimension.



* Maniputlation of joystick brings doubt great precision of control offered
* Exporting annotation files as MS Excel spreadsheet containing mean ratings for each sec, corresponding timestamps and metadata of tool configurations (Carma)

‘Modified version of Transcriber’ [9] was built in the early 2000s based on a speech transcription tool called ‘Transcriber’, which is adapted to implement a specific task of labelling emotional content of audio-visual stimulus in [9]. With this tool, annotation is made sentence by sentence by labelling it with multiple layers of emotional states from Major (primary) to Minor (secondary) and two separate 1D scales of intensity and control, with an intention to deal with blended emotions in real life. This process is heavily time-consuming and tedious in comparison to the other tools, and thus, it is excluded from the evaluation of tools for this project, regardless of the good analysis results presented in the study [9].



AffectRank is a tool developed to test a hypothesis of ‘’ proposed in study []. This study introduces a different annotation scheme ‘rating-based emotion labelling’.