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#ESSYS*: An Online Happening

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#ESSYS* is an online-based happening that unveils the underlying emotions in Twitter data. Built over the sonification system ESSYS, musical pieces are continuously generated and played online as an expression of Twitter's most prominent emotions. The authors of each tweet become the conductors of this happening, devised as an audiovisual showcase, where we hear Twitter's emotions, and we see the leading words that reflect this emotional dimension. The autonomous system is the performer in constant dialogue with each participant, in a unique event dependent on how the system itself interprets the tweets and their emotions, how it generates musical pieces, and how each audience member feeds the system and composes the happening's narrative. The system will endlessly compose as long as tweets with the hashtag #essys_xcoax are shared, in an ever-changing, audiovisual event to expose the driving emotions of #ESSYS*.

Description

We live in a time where digital media and Artificial Intelligence (AI) have been increasingly part of the living fabric of human interaction and communication. This promoted a fertile ground for the development of a synergetic relationship between innovative communication platforms. With this evolution, cyberspace has gradually become one of the most strategic and global places for communication, allowing a fast, efficient and customised share of data and personal thoughts (Clark 2010). Social networks have taken key importance on this paradigm shift, promoting the amplification of these user-generated contents through social media as active and effective platforms for sharing personal information online (Armstrong and Stojmirovic 2011; Rich 2015). More than just peer-to-peer communication, ideas and perspectives are shared inside a community of followers or friends who can share within their network, in an intertwined cycle of exchanges who define social tendencies and the communities themselves. Social networks have also been of key social importance in the democratisation of access to information for anyone. Nevertheless, the lack of moderation in these platforms also promotes the amplification of rumours and questionable information, fomenting the diffusion of misinformation. The emergence of AI employment to mediate and facilitate content promotion has made this feature of social networks more evident and accessible, easily providing tools to generate fake content. Currently, one may observe that this diffusion of doubtful information has a large impact in our societies, for instance, influencing national elections, *e.g.* (Bovet and Makse 2019), or promoting the diffusion of non-scientific and conspiracy theories, *e.g.* (Cinelli et al. 2020). This way, the emotions that people feel about the current condition of their societies, sometimes, may not be reasoned. However, these emotional views are still shared every day on these platforms, fomenting strong, social perspectives and status that can influence entire communities.

We propose an online happening that mirrors this social attitude, devising an audiovisual composition made by the *Emotion Sonification* SYStem (ESSYS) (see (Seiça et al. 2017)) which expresses real-time written tweets using our hashtag #essys_xcoax. More than a mere portrait of chosen tweets, we intend to draw a portrait of the emotions behind those tweets, unveiling a hidden, emotion-driven dimension representative of its participants. This way, the proposed performance is based on an autonomous system that independently collects the tweets, understands them, and translates their perception of the community to their audiovisual environment.

The concept of happening as a timely, unique event is inevitably connected to the environment, context, or social gathering where it takes place. Its conception and technical requirements may be multiple instantiated, replicated, even improved, but the event itself, its intrinsic effects and outputs, and how each member in the audience interacts with the artefact, will take a distinct form each time it is held. Happenings have been a form of personal, artistic and participatory expression since the 1950s, and its former definition by Allan Kraprow. His professor John Cage's *4'33 piece* (Kahn 1997) is, in itself, a musical happening each time it is performed, living through the audience's own existence. In a similar way, #ESSYS* occurs as a participatory new media artwork, where an autonomous system, ESSYS, takes the role of the performer. The system promotes one symbiotic relationship of dependency with its audience, appropriating the twittered text from the audience as feedstock to drive the performance. The system is born and embodies the role of a human performer, subject to the audience writings and bound to the emotional words of each audience member.

In practice, the system artefact is composed of two modules. The first module is responsible for the textual analysis of the tweets. The second module produces the audiovisual content, both visual and auditory.

The first module performs a textual analysis on the tweets employing Natural Language Processing approaches to recognise what are the predominant emotions in each tweet. The system is continuously searching for new tweets posted containing the hashtag #essys-xcoax through the Twitter API. For each tweet, the analysis follows a set of lexicon-based approaches, performing the following steps: it preliminary prepares the text to the semantic analysis by (I) translating the text to English, if necessary; (II) removing the contracted word forms; (III) replacing emojis by their meanings; (IV) replacing abbreviations and slang expressions by its formal forms; (V) replacing the words by their lemmas; (VI) replacing negations with antonyms; (VII) removing the stop words; and, finally, (VIII) tokenising the text. Subsequently, it performs a lexicon-based analysis of each word of the text, using a word-emotion association lexicon, developed by Mohammad and Turney (2012). Currently, the word-emotion association lexicon presents data about the relation of eight basic and prototypical emotions of Robert Plutchik's Wheel of Emotions (Plutchik 2001), i.e. anger, anticipation, disgust, fear, joy, sadness, surprise and trust, with 15 000 English words. Whenever an emotion is recognised in a word of one tweet, the words and the emotion detected are saved. In the end, we define the intensity of the relation between the emotions detected and the text by summing the number of emotions recognised in the tweets. In the end, we get an 8-value list for each

tweet, where each value is representative of the quantitative presence of each emotion in it. This method was developed using the natural language facility library fin,[1] the IBM Watson Language Translator[2] and the Merriam-Webster Dictionary API.[3]

On the other hand, the second module is responsible for the creation of the audiovisual elements of the artwork. This module examines the textual analysis from the tweets posted in the last five minutes to understand what is the most recognisable emotion that defines the audiovisual environment. This module comprises two simultaneous processes: the generation of the auditory composition by the ESSYS system; and the visual generation.

The auditory composition is adopted as the main dimension of the artefact, with a continuous, ever-changing musical piece that flows through each emotion. The composition is continuously generated using ESSYS, developed for producing automatic musical pieces representative of emotions. Currently, it is capable of producing audio pieces for the eight Plutchik's emotions, and it is built over two software tools: a Max patcher for the MIDI generation; and an Ableton live set to produce the final sounds. As a rule-based system founded by Western music rules, it is structured over two major musical aspects: melody and harmony. According to the probabilities defined for each emotion, the melodic line is shaped based on a melodic scale, which is in turn defined by the harmonic progression chosen for each emotional context. These progressions are predefined for each emotion, combining different chord natures, different voicings and their sequence. The melody notes are chosen randomly depending on the melody scale, which specifies the type of note (scale note, chord note or chromatism), the duration (from whole to eighth notes) and the intervals between them. For the tone quality, we used several timbres and synthesized sounds associated with each emotion, to create compositions embedded in the ambient music genre. For this platform, the timbres were adapted to use free VST plugins, more specifically the Spitfire Audio LABS[4] virtual instruments.

1. https://finnlp.gitbook.io/fin/

2. https://www.ibm.com/cloud/watson-language-translator

3. https://dictionaryapi.com/

4. https://labs.spitfireaudio.com

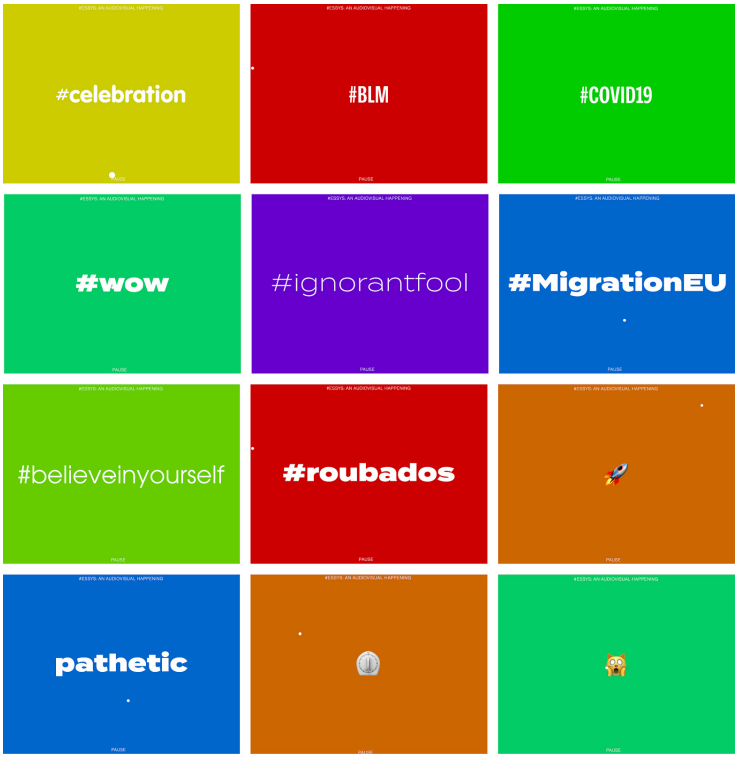

Fig. 1. Screenshots of the #ESSYS platform for the eight emotions.

The visual environment of the artwork emerges as a complementary visual stimulus to the sonic environment created by ESSYS. This environment is defined by a plain coloured background, whose colour changes based on the most present emotion in the analysed tweets, gradually transitioning from one tone to the next following the emotional ride. The colour-emotion mappings are based on the colour defined by Plutchik for each emotion: (I) yellow to joy; (II) yellow-green to trust; (III) green to fear; (IV) turquoise to surprise; (V) blue to sadness; (VI) purple to disgust; (VII) red to anger; and (VIII) orange to anticipation. Also, the most rated and representative parts of each tweet, from words to emojis, randomly take centre stage in the canvas, featured through ten distinct typefaces and loaded dynamically by Adobe Typekit,[5] that represent the variability of the emotions themselves. The relation between the typefaces and emotions are based on the works of Hyndman (2016) and Koch (2012), taking into consideration typeface's features such as weight, serifs, terminal shape and letter width. Figure 1 displays some examples of visual artefacts created by the system, with

5. https://fonts.adobe.com/typekit

more examples and information found at the hyperlink below.[6] Figure 2 presents a screenshot of a video demonstrating the system running using a set of testing tweets.

Fig. 2. Demonstration video of a #ESSYS platform using a set of testing tweets. https://cdv.dei.uc.pt/2021/essys_happening_demo.mp4.

#ESSYS* promotes a reflection on the authorship of the artistic use of AI systems, as well as the relationship that this kind of system may create with the audience. First, what is the role of the audience in this happening? Although the system generates the experience autonomously, it needs data created by people to produce it. This creates a symbiotic relationship between the audience and the machine to generate collaborative artworks, i.e. the system lives out of human data, whose opinion is in turn transformed as the artwork is experienced. Second, who can we consider to be the creator? Is it the system, which technically produces the content? Is it the system's designer, responsible for its building rules and elemental behaviour? Or is it the audience, the feeders of the artefact, whose shared tweets maintain the artefact alive and in continuous creation? Finally, the system reflects the potential of AI systems to mediate the generation of artworks that, even without a political statement, embodies the people's data in order to produce personal and contemporary significance to its viewer.

We can say the authorship of #ESSYS* is inevitably shared between the system and its audience, the living machine and its human fuel, without which it gradually silences and fades into quiet darkness. As such, it is only available during the conference, at http://essys.dei.uc.pt/happening, with its related hashtag revealed at the conference opening. As a timely, unrepeatable piece, #ESSYS* is unpredictable as well, as its contents, either the shared thoughts from the

6. https://cdv.dei.uc.pt/essys_happening/

audience or the words picked by the system, are unforeseeable. What will the joined emotions of the audience be? What themes will arise? What aspirations, fears, desires, goals or hopes will be revealed during this event? How will they be a reflection of this community, or even society itself? During this xCoAx edition, write #essys_xcoax and it will find out for you.

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