

ENHANCING VIEWER'S EMOTIONAL CONNECTIONS TO THE TRADITIONAL ART CREATIVE PROCESS VIA AN AI INTERACTIVE SYSTEM

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The goal of our research is to enhance the traditional museum viewer experience by constructing an interactive exhibition piece where viewers can emotionally interact with the act of creating a fine art painting. Through our interactive Creative Artificial Intelligence System (CAIS) which generates art portraiture, we try to recognize what our users are experiencing (emotionally) when they view art work by considering their emotional responses in creating and evolving their portrait painting and using that as input within our system. Ultimately we hope that our CAIS system can bring unique learning tools to art education and appreciation by focusing on affect as one of the main elements within the interaction -- where emotion is constructed, interpreted and given meaning in a dialogue between the user and the generated art of the system, or between many art viewing users through a system.

INTRODUCTION

This research specifically addresses how our Artificial Intelligence (AI) tools not only facilitate and enhance the understanding of a creative process of an artist but also adopt aspects of affect and emotions that are aroused from viewing the artwork. Our research aims to grow the knowledge and cognitive model of our CAIS system that currently has aesthetic reasoning based on artist's creative processes to explore/understand the mood and emotion that artist/users' intent to portray in a produced artwork. This encourages new collaborative practice that allows for users to create a dialogue between the system and the users that can organically, share and exchange real-time knowledge, evolve their creative process and to guide their artwork through an emotional space.

Our authored CAIS, explores the generation of new artwork using genetic algorithms where constraints are expressed as principles, rules and concepts related to visual organization of art and design compositions. The created output is a multilayered artifact based on a developmental processes defined by visual elements such as shape, size, color palette, texture and style. This was investigated in our previous work where we explored elements of the Futurist art master Umberto Boccioni's paintings are analyzed and input into the our CAIS, and a viewer/interactor can create many evolved new versions to explore/understand the underpinnings of the work through an experiential creation process [5,6]. This brings to focus the role of artists and designer as actor/agency working within cross flows of knowledge, perception and information. Hopefully allowing them to be a simultaneous participant and observer in ongoing collaborative conversation. We have begun to deconstruct the artwork as segmented rules, shapes and styles within our ongoing CAIS as an organism that can grow and evolve within each state of its development. This allows for a unique learning tool where museum viewers can use our interactive portraiture system to experientially explore the

creation of body of work through investigating texture, palette and brush strokes in general and through various user emotions.

ACTIVE PARTICIPATION IN LEARNING

Active participation is one of the most fundamental principles of learning and education theory. According to Dewey we learn best by doing, and it is simply insufficient to provide viewers with merely materials to look at [2]. European Union also published a LifeLong Museum Learning: European Handbook, that discusses constructivist theory as the desired model for museum education programs and encouraging the involvement of visitors within various activities, such as, making artworks and objects, theatre, role-playing as well as performance based activities [8]. It is also evident that such museum programs and activities are mainly geared towards kids, young adults and students rather than the general public. Learning experiences within museums are often built on wide range of materials, ideas and activities that surround the artwork rather than the materiality of the particular works [1]. What is significant and valuable to learning are the connections made by the audience and not just their direct exposure to the artwork alone. We also understand that visitors learning preferences and motivation for learning may vary, so we wanted to add to the museum environment a multimodal experience that is self directed, customizable and caters to various learning styles simultaneously, a critical factor for effective learning.

Therefore we wanted to design an interactive art education experience that focuses primarily on this notion of active participation in the museum environment. Not only do we want our interactive experience to act as a supporting material but also to supply viewers with wide a range of experiences. Our affective CAIS system invites visitors to participate in activities related to the exhibition theme, say Futurism or the color palette and stroking style of late Van Gogh, (Figure 4) encouraging them to engage their imaginations in response to the ideas provoked in the exhibition through exploration of artist's creative process and the act of making an artwork in a specific style and mood. This add-on interactivity acts as a catalyst for learning by providing new experiences and creative challenges; enticing audiences to further engage in the materials/ideas presented as part of what the museum has to offer. It acts as an analyst and bridge to fully involve viewers with the presence of the artwork and the artist's intent in the art museum setting by allowing for a participatory dialogue. Through our system, we want to encourage the viewers to explore a painting in depth and experiment by undertaking a personal journey and substantiate their personal narratives through emotional navigation in response to a selected artwork or art series.

Incorporating affect and affinities within interactive experiences can be challenging as they need to be open-ended in order for the users to be able to orchestrate their own emotional experiences. Hence, we wanted to provide the visitors with an activity to construct their experience out of what is important and meaningful to them, allowing for that personal encounter. To not only capture their attention but to engage them through a tool that stimulates and improve that inquiry cycle and sustains that further, both cognitively and emotionally.

INTERACTIVE EXPERIENCE

We use Artificial Intelligence (AI) tools that take as source a photo in front of our digital canvas and through their selection of an emotion (how they feel) create and explore a new generated artwork (Figure 1). This photograph as source is evolved into a final art portrait

work that uses the rules, styles and elements from our CAIS portrait painting system (as well as our labs on going research in historical art styles) and maps different texture, brush stroke styles and palette to the various emotion based on survey studies. This allows for an art education component to the work as we can use styles, palette and other factors in our CAIS system from a known traditional piece, an artist's body of work, or art general as we have attempted with Rembrandt [3], Picasso [4] and Boccioni [5] in past research work. In this way, we do not want to reduce the viewer's experience into a few variables or simple templates of styles. But instead use the more open and human sense of emotion as the core of what humans are and how we experience the world. This is an open research area, so understanding the right mix of templating for non-artists to be able to create something of worth versus a full interactive control for experiencing the process in a personal way requires several iterations. All aspects of the final images from our interactive are created generatively with texture synthesis, cognitive synthesis (using the palette and rules of portrait painting algorithms) as well as results validated from our emotional mapping survey studies.



Figure 1: A museum viewer approaches our system, has their portrait taken, then via emotional choices is able to explore the knowledge/experience space of fine art creation -- creating artwork through presence and emotion.

The original artwork or deconstructed seed “gene” objects are fed into the system [3,4] are not a template or design schema, rather pieces of knowledge (genes in evolutionary terms), content that can be fundamentally evolved through means of an interactive control. This creation and exploration process through the rules, styles and visual objects of an artwork gives the viewer/interactor an opportunity to explore the creation process of the artwork. Through our CAIS portrait system, the viewer/interactor can exchange, manipulate and evolve the deconstructed seed forms, their photograph based on emerging ways an artist's might negotiate aesthetic elements within their work (Figure 2). By the selection of different emotions, our goal is those interacting with our CAIS portrait systems can select an emotional space through transfer of knowledge from the provided domain. Our CAIS environments simulates the more deeply human cognitive process by attempting to depict a still work, not from the visual elements segmented out of the historical canvas, but also from new source, a photo portrait of a viewer in front of the digital canvas.

We have conducted a study to understand the mood, affect and emotion that are evoked from the artworks produced by our authored CAIS. Our study has provided us with preliminary data to inform and define various validated emotional spaces within our CAIS environment

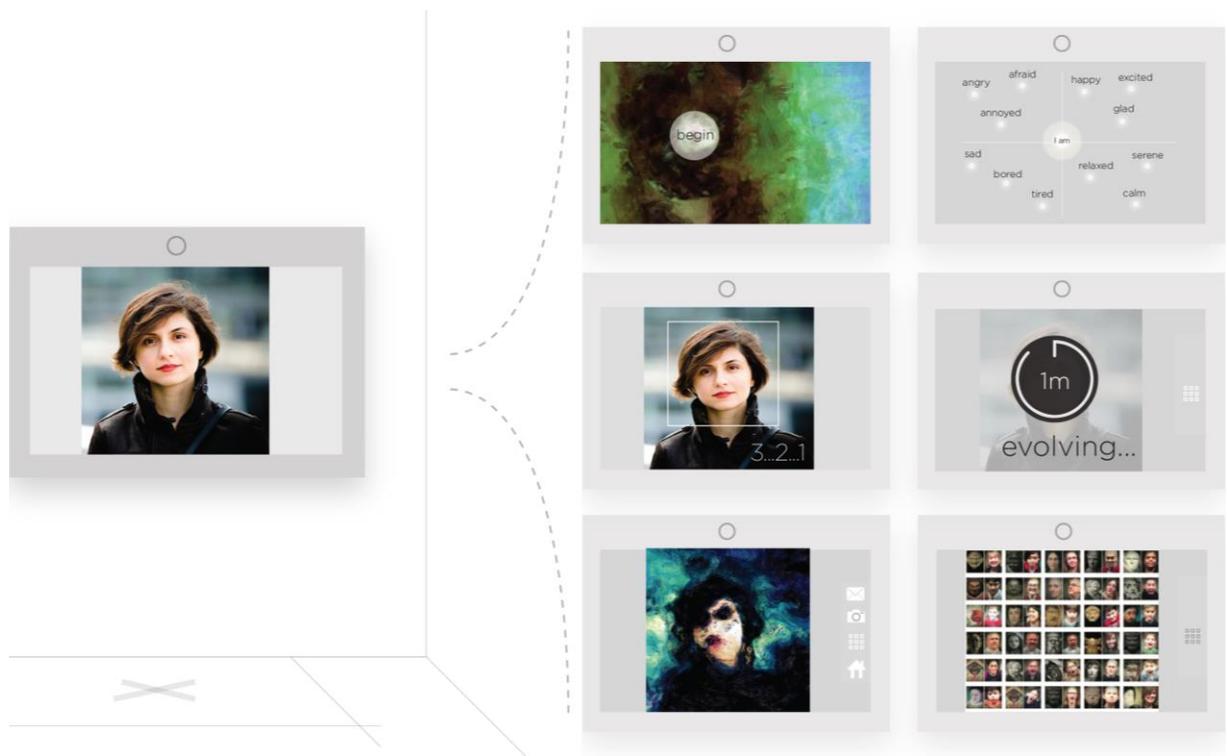


Figure 2. This is a depiction of the system in process, a photo of the viewer is taken, emotion choices are made by the viewer, processing occurs and one to several portrait styles are made based on emotional input. In future interactions, we are investigating using the user's mobile device as well as bio-sensing emotion.

according to the results from our user study surveys. The surveys identified corresponding emotions selected by majority of viewers of the various artwork (recipes) produced by our CAIS. We concentrated mainly on mapping of the mood to texture, brush strokes and palette. We used the emotional mapping system, based on Russell's circumplex model of affect [8,9, 10]. This model encompasses four quadrants, each representing a set of emotional category based on positive and negative levels of arousal and valence. For the purpose of our study, we chose the following 12 emotions (3 from each quadrant of Russell's model): excited, delighted, happy - satisfied, relaxed, calm - tired, bored, sad - frustrated, angry and afraid [8,9]. Our goal was to match visual attributes to certain emotions that were stimulated in our participants by the artworks produced from our CAIS regardless of the content and subject matter.

CAIS UX

The shift from a research based to practical application of CAIS systems such in museums requires attention to the collaboration and creative processes of the users (artists/viewers). The design of such systems needs to not only support their cognitive load of the process, but provide users with an engaging environment where their interaction with the system becomes transparent and provides a poetic experience that resonates immediately but allows for reflection and continues to inform later. It must have an essence; where it is meaningful yet not trying too hard – it needs to be intuitive. There is a fine balance between conveying art education, but yet providing the user with an exploration tool. Part of our research especially in the UX domain is to allow for both knowledge gathering (art education) and knowledge exploration. This shift of focus from knowledge taxonomies to problem-solving situations provides a more engaging educational experience to visitors.

It is important to value the role of the human collaborator and user experience while working with computational creative systems and to create a dialogue between the system and the users that can organically, share and transfer real-time knowledge and evolve their creative process. Some generative and AI systems value the final result over user input – meaning the interactive input of the users only minimally affects the final results. This problem is seen allot in early interactive systems. Our goal is to keep a high final output quality but assure the user participation is paramount to the process – without it, the reflection and personal experience aspects of education are diminished. In this way, the integration of user experience within computational creativity systems encourages new modes of creative practice where users remain fully engaged in their creative process and exercise their creativity through experiential learning, reflecting and creating. Such engagement can be explored through various modes of sensory input, new affordances, experiences, and interactions with the inclusion of embodiment and movement taking into consideration interactivity, engagement, collaboration & communication.

Our CAIS portrait system explores new modes of engagement with art in traditional museums through various user experience (UX) strategies based on our studies. It is important goal to create harmony between the modalities of their interactive experience, from the initial encounter with the system to the final generated artwork they create (and explore). The system attempts to use user emotion as both a social embodied process in art and painting, as well as a notion of a traditional artist's expression and intent. We want to focus on the emotional journey while interacting with a generative art piece and involving our users/viewer in the meaning making process. This spiral of experiencing, reflecting and making provides a participatory platform for co-creation of ideas, which is visitor focused, open-ended and prepares the viewer for broader, richer, learning experiences. This user experience process, by exploring the various palette, brushstrokes and texture which can add to the traditional art viewing process by providing the audience with an interactive experience to better understand and connect with the traditional painter's possible authoring experience when they paint, or at least to personally experience the palette, brush stroke style, and other aesthetic choices of that artist (Figure 3, 4, 5). This experience of interacting with art creation allows the viewer to connect to a traditional painter's creative process and their expressions through a shared meaning, allowing for a deeper personal appreciation of their work.



Figure 3. Example of an exploration of palette and stroking style of the Impressionist era of Claude Monet's "Sunset in Venice" 1908 using our CAIS personal portrait from our system (right).

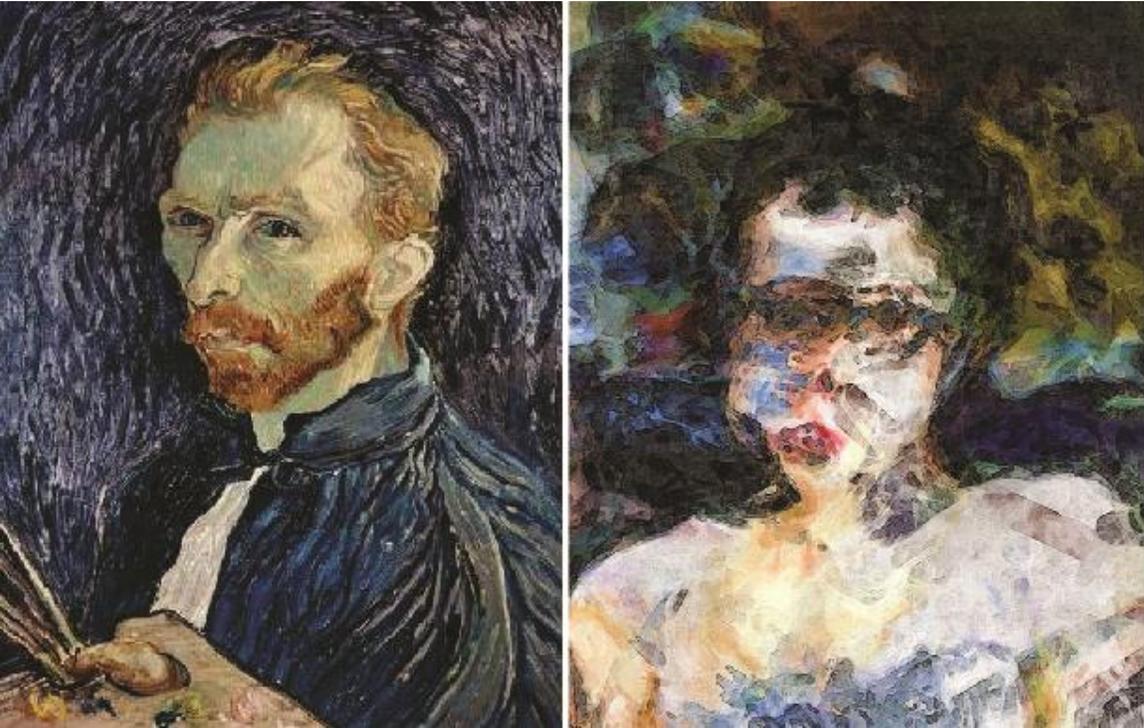


Figure 4. Example of an exploration of palette and stroking style of the Post-Impressionism era of Vincent Van Gogh 1889 using our CAIS a personal portrait from our system.



Figure 5. Example of an exploration of palette of the Post-Impressionism era of Vincent Van Gogh 1889 using our CAIS personal portrait system.

Our system also offers different levels of possible engagement as viewers can choose to step back and observe the interaction of others with the system or go through the archive of past evolved portraits. This allows for stimulation and continuity of experience through engagement with the past archived portraits that users have made, each tell a different but related story.

They are also able to share their creations (digital portraits) with friends (Figure 6), which promotes the social component and shareability both in the museum and in a large social venue that can support trips to the museum. Working with the museum, there is a social media/viral marketing aspect where once setup, users can email a URL of their portrait to others to share their experience, both branding the exhibition and inviting a larger community to come experience the work by visiting the museum. This experience also allows for personal storytelling, where the viewer can formulate and develop their own narrative of their portrait through the selection of various emotions. Identity, like interest, develops through interaction; both interest and identity develop in relation to available experiences and to how learners perceive, understand and represent these experiences. Our interactive process provides an environment where viewers become co-authors; through participating in the creation of the portrait, and personalization of the artwork based on their mood and emotion that only relates to them in that moment of interaction. This interaction enables viewers to learn by creating knowledge through experimentation and formation of purposes driven by their curiosity, interests and emotion, rather than simply transferring it.

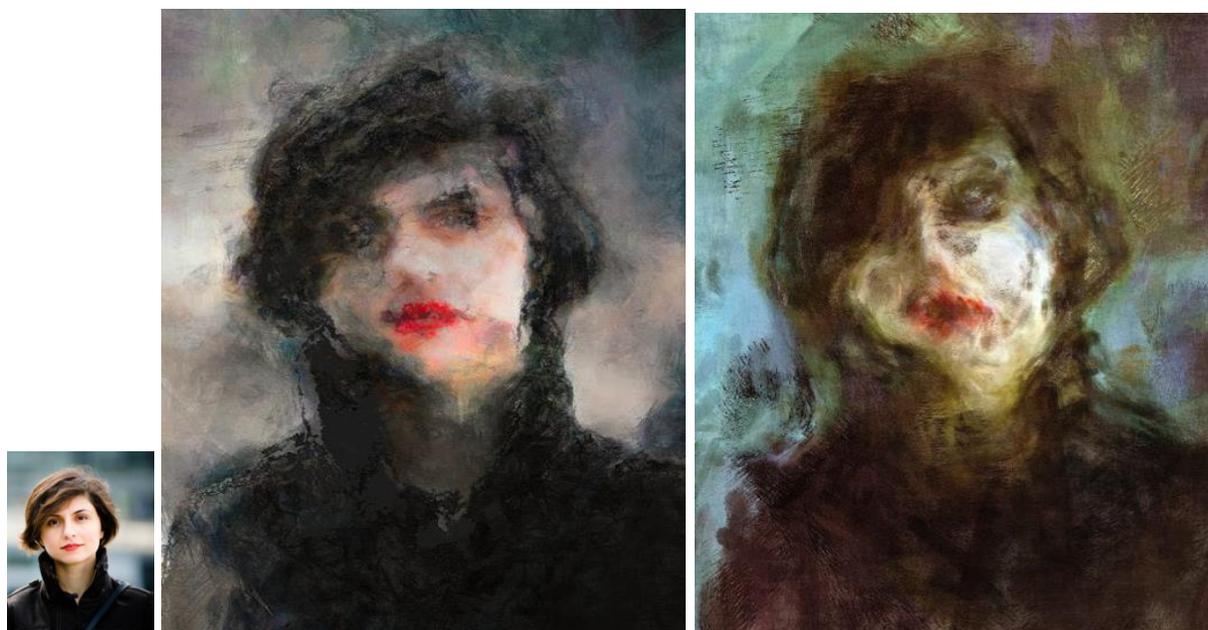


Figure 6. Source photo (left) with examples of unretouched, purely software generated output via our emotion AI engine.

CONCLUSION

This research aimed to enhance engagement and active learning in museums by facilitating the audience's understanding of how emotion and mood can effect the traditional artists' creative process and their art through their own exploration of various affect while interacting with our generative painting system. Interactive and experiential learning in museums is beneficial for both the participant (the learner) and the experience provider (the museum); as the visitors develop an emotional engagement and continue to share their reflections. Using specific CAIS based generative digital tools and hardware setup, this experience can enrich their personal connection to the traditional artwork through the appreciation of not only its physicality; palette, brush stroke and texture but also its ecology, time, history, intricacies and its mood through an emotional navigation. The viewers can now value and immerse in the artists' creative process and weave a personal narrative based on their experimentation. Care and

iterative design and refining cycles are needed to be both respect the traditional art and be able to explore / reflect on some aspects of that art via another (i.e. the viewers generated portrait) interactive medium. For future, work we want to refine the system in real world sceneries and we want to dig deeper into full body experiences, since emotion is a social and embodied process and there are multiple ways of expressing, sensing and feeling emotion such through movement.

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