A Collaboration with DARCI

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Abstract

We briefly outline several different ways in which DARCI, a budding digital artist, can interact with people in an artistic sense. These include acting as the medium for sociological experiments, acting as artistic juror, acting as artistic collaborator, and modifying environment to affect mood.

Keywords

creative process, art, collaboration, evolutionary system

ACM Classification Keywords

I.2.m Artificial Intelligence: Miscellaneous

Introduction

DARCI (Digitial ARtist Communicating Intention) is a computer system designed to eventually produce original and meaningful images [4, 5]. Inspired by Csíkszentmihályi's systems model of creativity [1], DARCI is designed to function in a social environment. She begins by learning how to associate language with images through online training by human teachers. Currently, DARCI can only associate adjectives with low-level features extracted from image, but in the future, she may be able to associate much more. This understanding of language provides the basis for DARCI to produce original images herself. Currently, when provided with a source image and list of adjectives, DARCI can render the source to match the adjectives in an original way. Eventually, she will be able to produce entirely original images and communicate the intention of her artifacts through the language she is developing. She will use the social and environmental context of each moment, as informed by data obtained from the internet, as well as her training to make decisions regarding the creation of her artifacts.

DARCI is partially dependent upon her interaction with human teachers in order to learn meaning. At DARCI's website (http://darci.cs.byu.edu) volunteers can view random images and describe them for DARCI. Additionally, DARCI will describe images herself and volunteers can correct any mistakes they feel she has made. This is very similar to a student-teacher interaction among humans. With a series of neural networks trained with this human labeled data, DARCI learns to associate descriptions with combinations of image features present in the images. She is then able to generalize this knowledge to images that she has never seen before. Currently, DARCI's descriptions include only lists of adjectives; but in the future, these descriptions could be expanded to natural speech. DARCI can also assign quantitative values to the image-adjective associations. For example, she can indicate how "abstract" an image is. In this way, DARCI

can analyze and evaluate any images she is presented with, including her own attempts at art. Figure 1 shows a brief outline of the system.
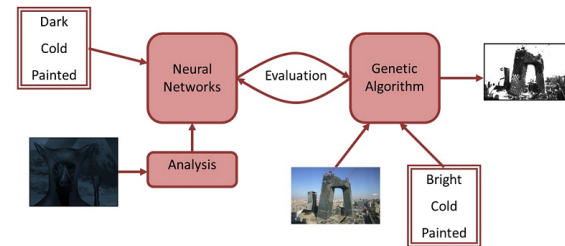

Figure 1: Overview of DARCI's artifact creation process.

Sociological Experiments

Since DARCI's concept of meaning is shaped by those who train her, what she produces and how she judges art is directly impacted by her environment. This yields the possibility for an interesting study analyzing different social groups. One group of individuals may perceive a particular image feature in a different light than another group. For example, what may be funny to one group is sacred to another. If different versions of DARCI were trained by distinct social groups, what would be the differences in her judgment and the artifacts she produces? In a sense, DARCI would act as a filter for the different social groups, providing a new lens to qualify social variances.

Figure 2: Photograph from the *Fitness Function* closing social, a gallery where DARCI acts as the sole juror.

Figure 3: An image, created with picbreeder, used by DARCI as the source for Figures 4-6.

Judge and Juror

DARCI's ability to learn artistic associations between language and art enables her to evaluate and make certain judgments of art. DARCI could act as an art critic or juror. Museum curators could enlist DARCI's help to evaluate incoming artifacts and provide interesting insights that could help curators decide whether or not an artifact makes it on display. To some extent this has been done already with DARCI acting as the sole curator for the show *Fitness Function* (see Figure 2) which took place at Brigham Young University in 2010. An updated version of *Fitness Function* will also take place at *ACM Creativity and Cognition* this year. A more collaborative effort between DARCI and museum curators would be very interesting. Curators could teach DARCI to look for certain characteristics which could help automate the selection process. DARCI could also be used as an "unbiased" judge to act as a counterbalance to the human curators. In any case, DARCI has the potential to be a helpful tool for art critics.
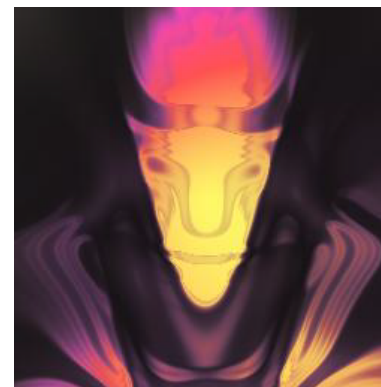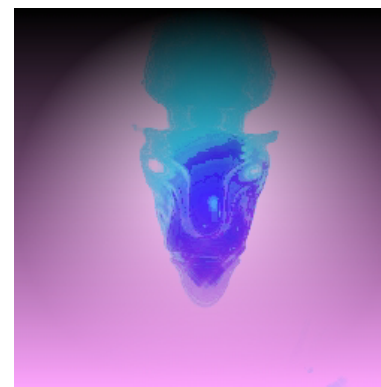

Figure 4: A peaceful rendering created by DARCI of the source image in Figure 3.
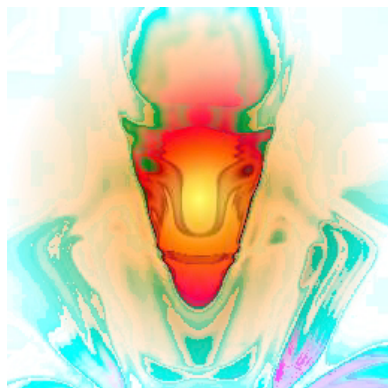
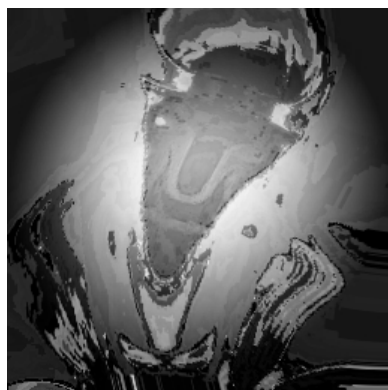Figure 5: A happy rendering created by DARCI of the source image in Figure 3.

Figure 6: A scary rendering created by DARCI of the source image in Figure 3.

Artistic Collaboration

DARCI's ability to evaluate art could also be useful in a collaborative effort with the artists themselves. The artist could come up with an artifact and DARCI could provide feedback offering suggestions to the artist. For example, suppose the artist wanted to create something that communicates peace and a sense of calmness. DARCI could evaluate the artist's initial attempts and inform the artist of how peaceful and calm the image is. DARCI could then offer suggestions on simple ways to make the artifact more peaceful and calm by providing several new renderings of the initial artifact. The suggestions and changes that DARCI proposes could give the artist new ideas and may even cause the artist to take the image in a completely different direction than originally envisioned. Thus the artist's ability to create an artifact that communicates the message or feeling they intend is enhanced.

Consider the following example of how this collaboration could take place. Figure 3 is an image created with picbreeder (http://picbreeder.org/), an art application designed to create original art through a human-in-the-loop evolutionary algorithm. Figures 4-6 show three renderings of Figure 3 created by DARCI to reflect the adjectives peaceful, happy, and scary respectively. These renderings represent possible suggestions DARCI could give to an artist trying to decide where to go from the source in Figure 3. Using the picbreeder image as a source also gives some indication for what DARCI may be able to do automatically once she generates the source image herself in addition to the rendering rules.

Adaptable Art

DARCI is intended to be an artificial artist that has the ability to communicate meaning through its artifacts. The advantage of a digital artist would be its ability to automate the rendering of artifacts. DARCI currently has the ability to modify images to reflect the meaning of certain adjectives. This would be useful in a public setting such as an airport, hotel, classroom, doctor's office, or even popular websites. The art on the walls could adapt and change automatically to communicate a certain mood or theme to those in the room.

For example, the art in a hotel could be something bright and energetic in the mornings, while at night the art could exude a more relaxed and peaceful tone. The art could also adapt to the weather to promote a feeling of warmth when it is cold outside or calm and happy if it is stormy. The art on display could adapt to seasons and holidays like becoming dark and scary during the Halloween season.

Development and Future Work

As previously mentioned DARCI is currently limited to adjectives, and can only associate these adjectives with low-level image features (such as color and texture). Furthermore, DARCI can only produce original renderings of existing works. Our next step in DARCI's development will include the generation of original images through a combination of algorithmic art and image collaging algorithms [2, 3]. DARCI's evaluation methods will continue to guide the direction of these processes. We will endow DARCI with the ability to identify and build a cognitive model of individual teachers, enabling her to have an "opinion" of those who provide her training data. We will also add web-crawling to DARCI's learning opportunities. Common natural language algorithms will be used to automatically label the myriad images available online for additional training data. We will continue to refine and add to the image features that DARCI can recognize, possibly combining that image data with the textual context of images (this will always be secondary to actual visual data).

Eventually we will add noun and verb parts of speech to DARCI's repertoire. In conjunction with this, we plan to use computer vision techniques to allow DARCI to build abstract models of objects contained within images. We will then add metaphor synthesis to DARCI's skill set and use this to help direct her image creation. Around this time DARCI will be able to extract useful information from web text and use common news sites to fuel her "mood". This combined with metaphor generation will drive DARCI's artistic intention allowing her to, on occasion, produce original images without any direct input from users. Of course, user input and feedback will be a continuous part of her development. DARCI will accept commissions from users and respond to their criticism.

Conclusions

DARCI is a system designed to eventually be creative within a social context. In its early stages, DARCI has already inspired strong human-machine interaction. In fact, at this year's *ACM Creativity and Cognition* conference we will present a paper describing a study that involves art students' interactions with DARCI. Specifically, we will detail activities that the students designed to interpret DARCI's perspective and thus better understand their own creative processes. As our work on DARCI proceeds, the ensuing dialogue between artist and machine will continue to develop.

Acknowledgments

References

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