PROJECT Amoreiras (Mulberry Trees): Autonomy and Artificial Learning in an Urban Environment

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Abstract

This artist’s writing discusses Project Amoreiras, developed by the Poéticas Digitais Group. The proposal is an urban intervention involving art, technology and environment, configured as an interactive installation of mulberry trees on the Paulista Avenue (São Paulo, Brazil). The article highlights its poetic and technological elements as critical positioning on pollution in the metropolitan environment, the processes of autonomy and artificial learning, the emergent behavior of the trees, the application of John Conway’s neighborhood principles to the project as well as the positive reception of the proposal by the pedestrians during the exhibition.

Keywords: interactive installation; art media; artificial learning; autonomy; environment; urban intervention.

With the first morning sounds, a tree responds to the pollution that has already started to collect on its leaves, moving to rid itself of the dirt. The louder the noise—the roar of the engines, the honking of car horns, the voices of people passing on the street, or not-so-perceptible noises like the rumble of the subway—the more the tree swings. The younger, smaller trees do not know how to deal with this environment of noises and moods. They do not know how to shake off the grime of the city—they are newcomers. However, they are able to learn how to respond to the environment and survive.

Amoreiras is an artistic project about autonomy, artificial learning, nature and environment. The main characters are five young trees on the Paulista Avenue, the cultural and economic center of São Paulo: five small, recently planted red mulberry trees, with cylindrical composite drupes and juicy infructescence with an acidulated and pleasant taste that matures in the spring. They have heart-shaped, serrated leaves that serve as food to the silkworm, flowers in catkins and dark-red-to-almost-black fruit that is edible au naturel and often used in jams. This kind of tree is forbidden on city avenues because they pollute the roads with leaves that fall into the culverts and bear fruit that attracts small birds and leaves indelible stains on the sidewalks and clothes of the passersby [1].

Planted in boxes, each mulberry tree is fitted with a prosthetic that aims to provide, correct or increase an impaired natural function and therefore ensure its survival. Metal, rubber and acrylic prostheses connected to small motors and an Arduino card are inserted in the young stem, which vibrates as if in dialogue with the factors related to the pollution. The swaying of the branches is caused by a “motor-driven prosthesis,” connected to the trunks of the trees (Fig. 1). Each one has a similar prosthesis, which varies, however, according to its peculiarities and anatomy. In this way, the interactive installation establishes its proposal for artificial learning, involving art, environment and new technologies, in a dance of leaves and a shaking of trunks, making the swaying of the branches at times apparent and poetic, at others mechanical, sometimes caused by the wind itself blowing against the leaves.

The choice of the mulberry trees as elements of the artwork and the focus on their leaves can be explained by Biondi and Reissmann’s study [2] on how trees react to pollution in big cities, including the criteria of their evaluation and maintenance:

According to Harris [3], the problems with air pollution are observed in the leaves themselves because they are the parts that most evidence the symptoms caused by this factor. The symptoms vary greatly, depending on the species and state of growth, type and concentration of pollutants, extent of exposure to humidity, light, temperature and other factors [4]. … The parameters used to evaluate urban trees are still very subjective. In agriculture and forestry, evaluation of the performance of trees is determined by their respective productions, based on the criteria referring to quality and quantity, according to their objectives. While in urban areas, the criteria used transcend these qualitative and quantitative values because the involvement with aesthetic values is much greater and much more difficult to quantify, due to sentimental and psychological factors. Currently, the monitoring of urban trees has been conducted to observe and measure variables that may not be informing the good performance of trees. Thus, it is urgent to search for other practical and accurate parameters to facilitate the urban trees maintenance (Emphasis added).

One of the parameters for maintenance of the urban trees in the project Amoreiras could be the notion of autonomy, present in the learning process of those cyborg-trees, with their copper rod and poetic anti-pollution prostheses.

Throughout the day, the learners, initially clumsy, start reacting more autonomously to incoming pollution data, swaying when there is too much noise (an indicator of the level of pollution) and lying at rest when the threat is smaller. By the late afternoon, differences in their behavior are noticed, which shows they are learning and possibly dialoguing with each other, exchanging data in a dance of mechanical prostheses, rods, rubbers and leaves.

The behavior of each tree is autonomous and occurs in response to the intensity of the ambient sound, also being influenced by each tree’s personality. In a process of emergency, the “pollution” is captured through a microphone: The system measures the noise variations and discrepancies as a symptom of several polluting and pollutant factors of the metropolitan environment that affect the urban trees. The artwork promotes observation and maturation of the trees’ behavior, which are enabled from an artificial learning algorithm. The sound is captured directly by a patch written in Pure Data, which sends the information to the main application, developed in Java via
The environmental proposal of the artwork was very well perceived by neighbors and pedestrians (Fig. 2). In almost three months in public space, despite the delicate trees and coupled mechanisms, no depredation or damage was done to the installation. Pedestrians reacted very pleasantly to that unexpected visit on a so-busy avenue in São Paulo. During the exhibition period, the trees, allowed provisory as an artistic urban intervention, were full of fruit, turning the surroundings into an enchanted area and people stopped to see, touch, pick fruits, interrupting their automated walk. The red fingers of the fruit pickers and the act of removing the dust from the shoulders by those passers-by constituted an urban dance, recomposing their routine, now touched by an affective factor: A memory of our forgotten yards, forgotten gardens and seemingly endless childhood times.

Members of the Poéticas Digitais Group that participated in this project were Gilbertto Prado (coordinator), Agnus Valente, Andrei Thomaz, Claudio Bueno, Daniel Ferreira, Dario Vargas, Luciana Ohiara, Lucila Meirelles, Mauricio Taveira, Nardo Germano, Sérgio Bonilha, Tania Fraga, Tatiana Travissani and Valzeli Sampaio. The project was selected for the Emoção Artificial (Artificial Emotion) 5.0, Technological Bi-annual Art Exhibition sponsored by Itaú Cultural held in São Paulo 30 June–5 September 2010. It was also exhibited during the third showing of digital art—Technophagy curated by Giselle Beiguelman in the Tomie Ohtake Institute in São Paulo, 15 August–16 September 2012.

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