Machine Learning for Performative Spaces

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Abstract

This paper discusses the development of a large scale permanent public interactive media platform situated in Southport, Queensland, Australia, and specifically, how machine learning has been implemented to enhance and co-create the delivery of live performance presentations by artists at the site.

The media façade is located at the Telstra Network Exchange in Southport Queensland at a busy public intersection. It comprises of 8 audio-visual displays, live camera inputs, computer vision hardware and LED lighting.

The project aims to create a playful activated urban space and provide circumstances and infrastructure to foster and support live performance in the city. [1][2][3]

Fig 1. *Telstra Interactive Hub Southport* 2018, Concept Drawing.

To this end, we see the media façade as an interactive hub designed to encompass several modes of operation including interactive games, embodied music composition tools, and a performance mode in which the hub acts as a sophisticated electronically mediated stage that offers street performers and buskers a dynamic lighting and visual accompaniment to their shows.

The design approach was to consider these as distinct goals. Firstly, the design of the space created a flexible platform for all interaction modes via transparent so-called Natural User Interfaces including 14 camera's for computer vision and image acquisition, and 8 distributed microphones. This hardware array supports rich acquisition of overlapping data at depth. [4] [5]

Secondly, machine learning was used as a way to address the challenge of creating a system that coherently supports the activities of a wide spectrum of unknown future performers utilizing the site. Rather than a generalist approach to creating visual and lighting content, machine learning was chosen to tailor the lighting and video content to the specific characteristics of the individual performer, and as the interactive hub is a permanent public art work, the more performers the work is exposed to over time, the more sophisticated and refined the system will become. [7] [8] [9]

Live performance mode uses an implementation of TensorFlow within the Touchdesigner software environment to classify and choose procedural parameters that drive a generative visual and lighting environment that is displayed on 8 screens and a lighting system that spans the 19 meter 'stage' area. The system has been initially trained prior to the launch through the creation of a library based upon audio of buskers and street performers from YouTube. This data was gathered to create a base library of genres to construct the architecture of the system. Following this, all

live performances on site will be recorded and converted into soundprints. Once the performance has been labeled, the Tensorflow is updated to extend its knowledge of a current category or to integrate a new category. In this way each performance improves the system creating a tailored reactive installation that continually improves over time.

References

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Biographies

Alex Davies is a media artist and Scientia Fellow at the SW, Australia Creative Robotics Lab. His practice spans a diverse range of media and experiments with interaction, technology, perception, mixed reality and illusion.

Brad Miller is a visual artist, curator and academic who works with technology and networks to create moving pictures and large-scale interactive installations about memory and time in an exploration of identity. His artistic practice bridges the fields of media arts, participatory urban media architecture, software development and expanded photography.

Boris Bagattini is an Artist and Programmer. He has directed and led visual effects teams on a myriad of film, TVC and broadcast projects. Since 2011 Boris has been working primarily in large and small scale theatre, projection mapping, event video, live television and interactive artworks. In the last two years he has been engaged as Screen Graphics and In-Camera Interactives Programmer for Ridley Scott's *Alien Covenant*, Guillermo Del Toro's *Pacific Rim Uprising*, and the DC Comics production of *Aquaman*.