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Master's Project Report
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Advisor: Andries van Dam
Project: Extending Touch Art Gallery

Introduction

Touch Art Gallery (TAG) is an application allowing for the compilation, contextualization, and exploration of digital collections of art and manuscripts. Built to be intuitive and use familiar touch gestures to facilitate a user's interaction with digital content, TAG itself is an exploration in human-computer interaction and touch-centric computing. By working on this project, I have not only gained development skills that will be extremely useful in my future career, but I have had a chance to work in a collaborative research environment to develop new approaches to user experience.

Touch Art Gallery splash screen

Background

TAG originated as a means to explore extremely large or fragile artworks using familiar touch gestures. In its first iteration, well before I joined the Brown Graphics Lab, it was an application dedicated to a single artwork, the 270' x 5' *Garibaldi Panorama*. This piece is, for all intents and purposes, inaccessible to researchers and casual viewers, since it is kept on Brown's campus in an air-conditioned room. In order to properly research the piece, faculty in the Italian Studies department needed a digital platform for viewing a high-resolution scan:

The first iteration of TAG: the *Garibaldi* project

The application developed in the Graphics Lab -- in collaboration with the Brown University Library and the Italian Studies Department -- addressed this need through an intuitive touch interface, and it also added features to make the *Panorama* accessible to the everyday viewer. Associated images were linked to specific parts of the artwork, allowing viewers to draw connections between themes in the artwork and those in other works, and narrations were added to further augment the viewing experience. This approach of allowing straightforward interaction and associated content still informs TAG's structure today, and we have striven to develop features that extend these ideas to create a more complete application for the management and display of digital content. Towards this end, we have added an authoring interface that allows curators and educators to upload and manage their content, and a dedicated TAG server application acts as a repository for this content.

Over the past year, the TAG interface has grown significantly, and the application is now in the Windows app store. Additionally, a large portion of TAG has been converted to be cross-browser compatible, making it more widely available on the web. Our ongoing hope is to provide museum visitors, curators, and students with a novel and unique exploratory experience.

Contributions: Overview

My contributions to this project in the 2013-14 academic year have been three-fold: I have been a developer working to implement a number of user experience improvements and feature enhancements; I have been a liaison between our research group and several institutions interested in using TAG; and I have been the team lead, providing group oversight and helping determine the direction of the project. In these capacities, I have gotten a thorough understanding of the process of conducting interface-driven research. In the following sections, I will describe in more depth my work in each of the three areas mentioned above.

Contributions: Development

I have worked on several large development projects under the TAG umbrella since September. First, I worked to allow curators to easily add associated media to their collections. This involved implementing changes to the user experience of the authoring interface to include a dedicated associated media management platform:
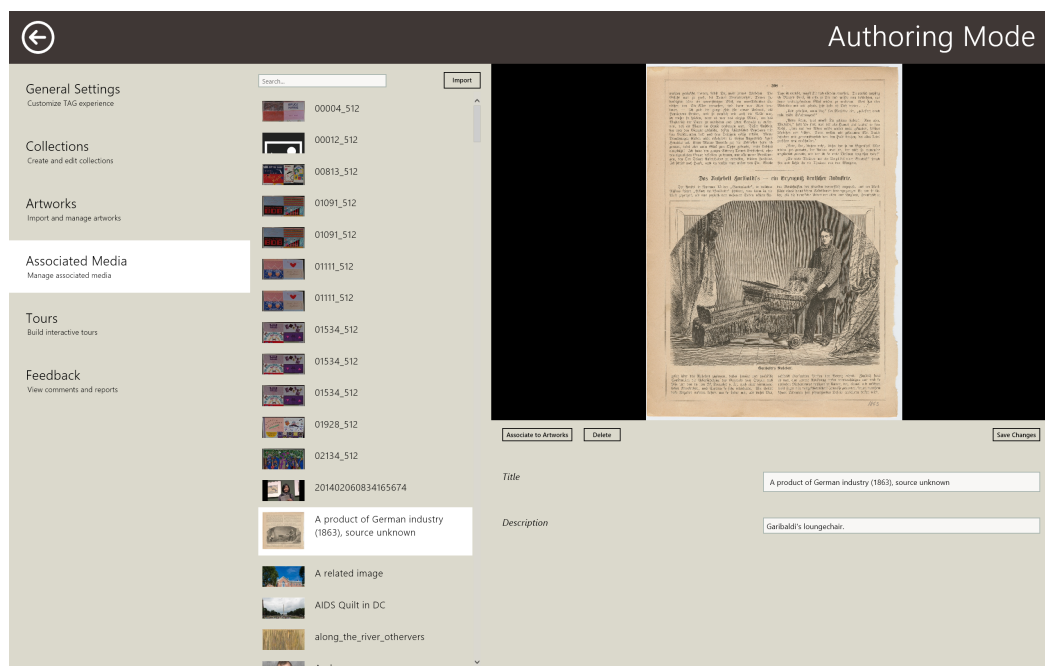

Associated media compilation and basic management
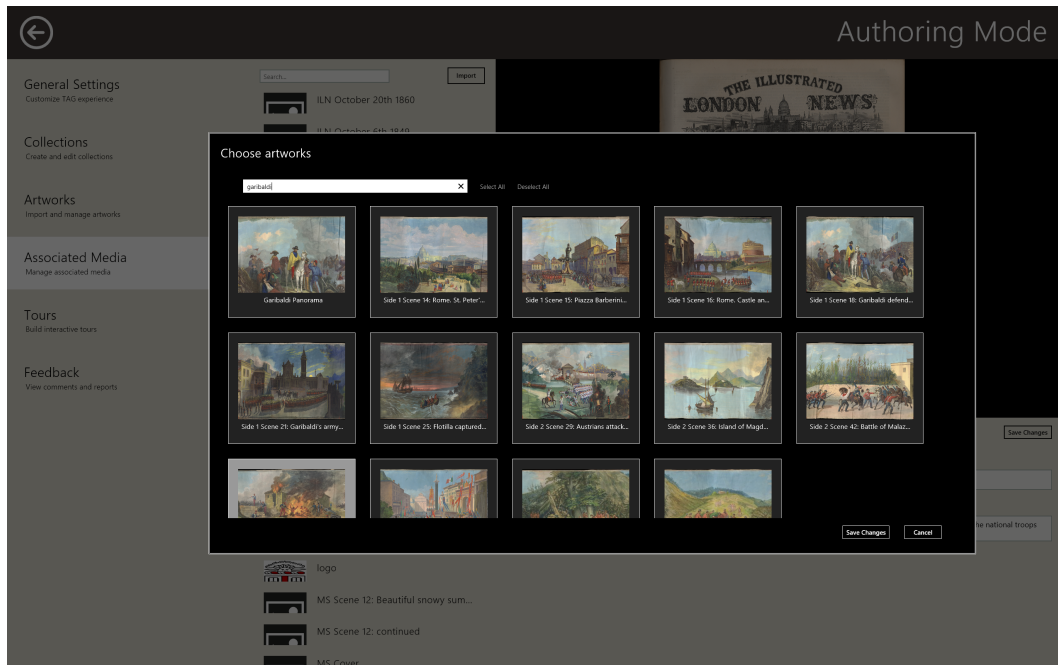
Management of media associations

This was part of a larger program to overhaul the design and workflow of TAG, and I contributed to several small sub-projects as well (including improving a tool for creating annotations in TAG's interactive tour authoring interface and adding server-side functionality to enhance the utility of TAG's collections).

More recently, we have made TAG's museum visitor-facing interface (referred to as the "kiosk mode") cross-browser compatible. This has involved a significant development effort, and I have been responsible for several of the architectural changes necessary for the migration. I have also worked towards eliminating Windows dependencies to make the transition to the web smooth.
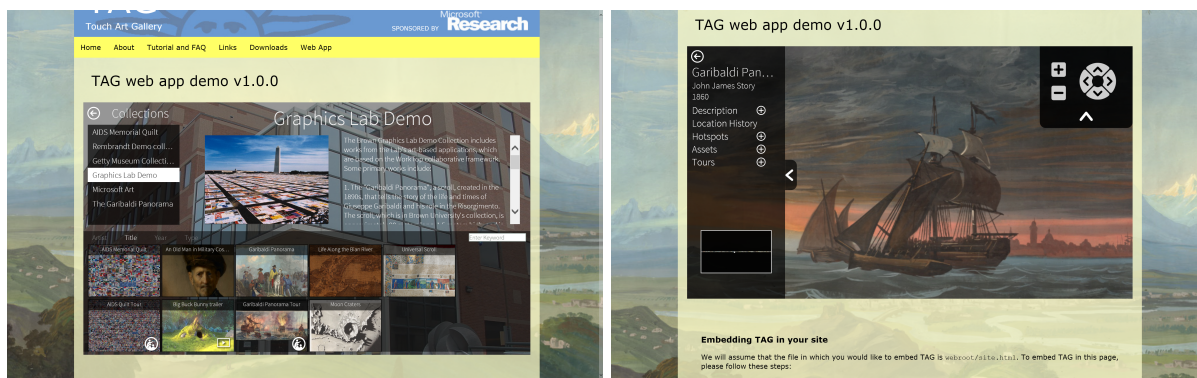
The Touch Art Gallery embedded web application

Finally, I have worked on two peripheral projects: automated testing and telemetry. Since TAG is a user interface-driven application, and performance is determined in part by appearance and smoothness, logic-centric unit tests are not always the best method for gauging whether TAG is performant. Therefore, most of our testing has involved repetitive motions and observation. To help facilitate this process, I developed a simple automated testing framework that allows the tester to simply watch for visual discrepancies.
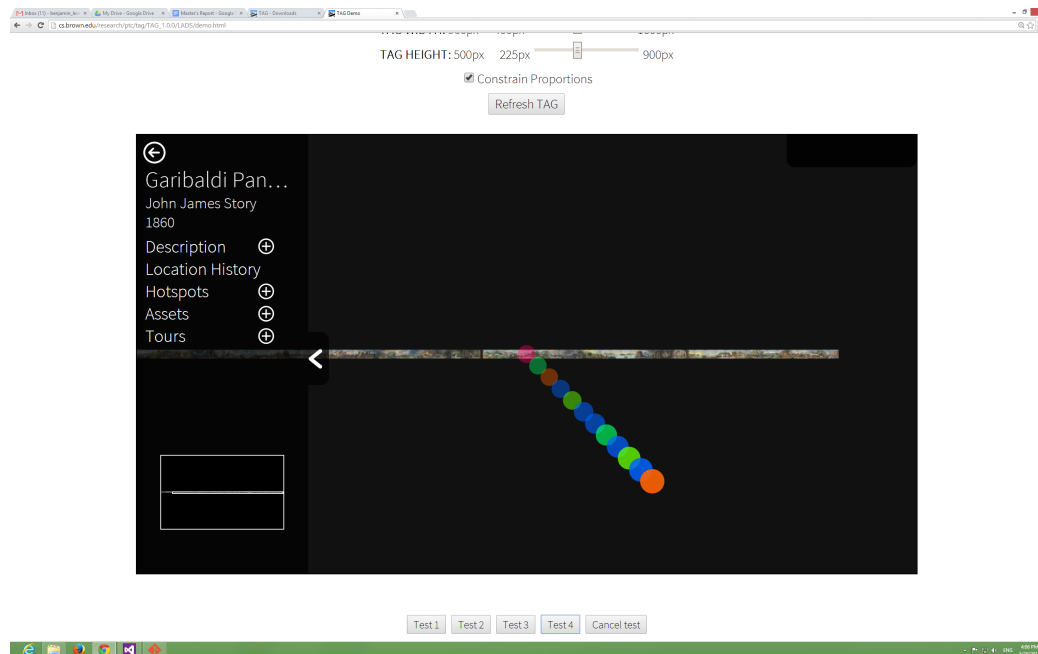
Testing interactions in TAG's artwork viewer; dots represent simulated touch points

The testing framework is designed to be highly extensible; tests can be combined like building blocks to simulate complex interactions, and distinctive visual cues communicate the current action to the tester.

The second peripheral project is telemetry, or the collection of usage data to identify use patterns and potential bugs. Work on telemetry for TAG is ongoing, but I have been developing a server to gather telemetry data and a basic client-side library for easy integration with TAG. My hope is that we can soon begin gathering data and put this information to use in refining TAG's interface.

Contributions: Outside Collaborations
In the past year, the TAG team has collaborated with a number of institutions, including the Seattle Art Museum, Brown University, the RISD museum, and Microsoft Research. I have been in contact with these groups as a representative of our team, and working with them has been an illuminating experience that will surely inform my work in the future. For example, it highlighted the difference between a developer's perspective of a project and a user's. Aspects of TAG that I, as a developer, found relatively minor were very significant to some institutions, and the

reverse was true as well. These realizations have led me to understand the importance of user testing in software development, a lesson that will serve me well.

As a result of these collaborations, TAG is now being used in two installations in the Seattle Art Museum and one in the Haffenreffer Museum of Anthropology at Brown University. We hope to pursue applications for TAG in education, too, and have talked with several educators here at Brown about using TAG as a teaching tool.

Contributions: Leadership
I have been the team lead for TAG this academic year. Responsibilities have included general technical and architectural oversight for the project, coordinating the distribution of work across the team (between 10-15 undergraduate and master's students since September), and bringing new team members up to speed. This experience has been invaluable, and I have learned a great deal about not only leadership in general, but about the dynamics and logistics of running a software development team.

Future Directions
Development on the Touch Art Gallery project will continue in the foreseeable future, and it will largely be driven by feature requests from collaborating institutions. I am particularly excited about potential uses in education, and the team is looking forward to continuing conversations with educators at Brown and starting new collaborations elsewhere. I hope the team will be able to work with a diverse group of museums, libraries, universities, and independent content authors to create a broadly useful and widely used application.

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