

# Sketchy: Interactive-Influenced Design

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## INTRODUCTION

This work helps understand the influence of watching expert artists drawing. We accomplish this task through Sketchy, an application that stores individual user stroke data and classifies users based on different drawing parameters. Exposure to drawings is monitored through Snoop, a feature that shows a user the most interesting sketch in a room. Our initial findings suggest that usage of the snoop button helps all artists in the room combine different ideas to generate final sketches that on average are rated higher than their non-snoop using peers.

Sketching is an instrumental process to create a better world through iterative design. Our earliest record of an iterative design process influenced by sketching comes in the early fifteenth century from Mariano di Jacobi detto Taccola. He created a book of sketches that demonstrated the iterative design process of creating alternative design ideas that share similarities and ultimately influence the final design. Fast forward to modern day and sketching has become a prevalent tool for designers. The advent of computers has created a robust tool-set for iterative design.

Where is user interface design taught? In universities this is often done in a classroom setting with a professor going through slides or demonstrating a tool. Students, as future designers, rarely have an opportunity to develop their skills in an iterative process with their peers.

The research presents a student response tool called Sketchy for lecture-style user interface courses. The tool allows students to wireframe interfaces, design typefaces, and draw visualizations during class on touchscreen and mobile devices, to receive peer feedback and to be discussed on the room screen. Most importantly, Sketchy contains a feature that analyzes user behavior to select the most interesting sketch. Other users can see this sketch at anytime and observe how it evolves. This allows a group of students to inspire each and influence design through an interactive and iterative process.

Through Sketchy, we provide the basis of an application that allows for designers to freely explore their ideas as

well as draw inspiration from others when needed. The tool serves as a preliminary application that can help coordinate hundreds of artists working concurrently to produce the best product. Thought leaders like IDEO have realized the benefits of having integrated teams of different designers working on the same product, in order to have the teams learn from each other's unique ideas and in the end create the best product which generally retains design influences from many different teams.

Imagine situations outside of a classroom or design studio. If open-source software held open rooms where any designer may begin working on their idea and see feedback from others in order to generate better design decisions. Other potential situations where coordinating people from across the world to work on projects where they retain their creative screen locally but also have the ability to watch masters working on similar projects may extend even to situations like software development.

## Influence and Iterative Design Philosophies

The main benefit of Sketchy is it enables a group of users to participate in a design process as individuals across various devices and locations simultaneously. This allows Sketchy to act as a virtual solution to replicate a collaborative design environment. This is important because previous work demonstrates that a group of users will create better designs than an individual. While this previous work concentrates on in-person settings, Sketchy aims to provide the same benefits to individuals in a virtual environment.

Sketchy mimics the classic sketching drawing process within a web application. This enables users to practice reflective feedback to iterate and develop better low-fidelity designs.

## SKETCHY WEB APPLICATION

Sketchy is a web application designed for mobile, tablet, and desktop devices that allows users to interactively sketch low-fidelity designs on a web-based canvas. Sketchy allows users to create and join rooms with other users. Unlike previous systems, Sketchy allows users to "Snoop" to view the most interesting sketch in the room.

## Interest embodies good design principles

The reason we focus on interesting images is that interesting images tend to generate the most conversation and have the potential to improve fellow drawers the most. The IDEO post about redesigning a shopping cart clearly displayed this potential, that interesting images or

ideas are those that challenge conventional thinking the most. These types of ideas have the highest likelihood of influencing the idea process of other artists.

The interest level of a sketch is defined by the sketch interest model (SIM). We developed SIM after conducting several in-person user studies. This allows users to compare, contrast, and iterate on their ideas based on other user's sketches.

Each stroke is captured by the browser and stored in a central server. Within a room a user can select the Snoop feature. This initiates the sketch interest model which calculates and shows the user the most interesting sketch within the room.

The sketch interest model uses low-level interactions such as stroke length and duration, time between strokes, undo/redo of strokes, and a user's self-identified sketching experience. Sketching experience ranges from a numerical value from 0 to 1.

Sketchy was designed primarily to facilitate intuitive and easy drawing practices on any device. The second motivation behind Sketchy is a desire to capture all user interactions with the HTML 5 canvas element that users draw upon. The sketchy applications runs on Node JS and Socket.io which fire whenever users have their mouse down and move their mouse on the element or if they have selected draw mode on their keyboard and begin moving the element. We continue to track all movements through the X-Y coordinates of the application until the users stops clicking down on the mouse or selects the stop drawing key. Every one of those interactions in our study is referred to as a stroke, with all the points traversed by the stroke saved as mid stroke values.

## PERSONAL CONTRIBUTIONS

For the sketchy project I was brought in as a RA (Research Assistant) in the fall of 2017. Throughout my tenure I was involved in many of the changes in the web application. I go through my updates on the Database, creation of the snoop button, creation of interest heuristics, contribution to future production of the paper, and finally additions to the front-end of the application.

### Database

When I first got into the Sketchy project, I was instructed to begin saving all information from users logging into the platform in order to create research questions and results for the study. The first way I attempted to solve this issue was to write many of the interactions to an external CSV file.

After getting the CSV file to work, I thought about how to create a persistent storage mechanism of the information. The best way I found in order to do this was to implement sqlite3 in the sketchy application. I managed to implement the database successfully and then began saving a number of different interactions in the application.

For every row I am saving the username, the room the user is working in, the experience level of the user, the interaction of the user, the timestamp of the action, whether or not the user is snooping someone else, the color the user is drawing with, the dimensions of the user's screen, and finally the operating system used by the user.

Some notable interactions that I had to work on was saving each stroke, which entailed saving all the (X,Y) cartesian points that have been traversed between the mouse down and the mouse up interactions. Through this work, we can now track a user's drawing path down to a single pixel.

Outside of the stroke interaction, I am also saving whenever a user changes color, accesses the Snoop button, clicks on clear, undo, redo, cancels out of Snoop mode and a few other features. The main reason for all of these saves is to help ensure that when we go through the data in our research we can accurately trace what each user was doing, when they were doing it, and hopefully answer why

### Snoop

Implementing the Snoop button was a major undertaking. The button would become the lynch-pin for our research involved in understanding influence through the sphere of drawing.

The Snoop button looks at all the other drawings currently in the room (if you are the only drawer than it does not show you anything), and selects the most interesting drawing in the room, excluding yours and shows you that drawing. It does not only show you that drawing but continually updates the drawing as the user whom you are snooping continues to fill in his or her drawing. The reason behind this is to show users an interesting image and provide them a mini live stream of updates so that they can continue to be influenced as the Snoop feature is not canceled.

As we continue to test the application, I intend the snoop button to be the lens through which users getting to see other's work and get influenced. Therefore, a lot of work needed to be put into the button, including redesigning the css of the website to ensure that it handled the snoop button's features correctly, making sure that users were unable to snoop on their own features and rows in the database being written whenever a user snoops and cancels snooping on someone else.

### Interest Heuristics

In order to get the heuristics that I eventually programmed into the Snoop button, I used a series of videos recorded by a fellow RA, Gabrielle Bufrem. Her videos showed that users were interested in a few different metrics when looking at each other's drawings. We used these metrics and a few other factors in order to come up with a heuristic to score each drawing made by a user and show users who are snooping the drawing with the

highest score (if a user's own drawing has the highest score, then the second-highest score would be shown).

Working with Shaun I came up with the equation that served as our first objective way of measuring the interest of images, while I hope and believe the algorithm will continue to get improved, I am proud of the work we did in order to take something as subjective as influence and code that into an equation that works well.

### **Creating the Data analyzer**

Another project I was involved in was the creation of the first analyzer for the Sketchy database. This analyzer goes through all the user sessions of the application and returns information such as: total number of users, the sketch ratio per user, the snoop ratio per user, the average use of colors per user, the total number of different screens used in the study, and the total number of Operating systems that were measured as well in the study.

Like Sketchy, I believe the initial Python analyzer file I built will continue to develop as the application gets introduced to more individuals and we begin running larger user studies. That is why I created the code to be extremely modularizable as well, so that future RAs would easily see the work that I have done and easily continue to develop upon it.

### **CONCLUSION**

The Sketchy project has taught me a lot about working with a team in order to develop insights into problems few have thought of before. I have enjoyed spending a half of my master's working on this sort of problem because of the joy of solving these problems with your peers. I have worked throughout the sketchy application from working on the CSS to working on the analyzer script to analyze the DB. This project tested my software engineering and research ability as I spent equal portions of my time trying to solve bugs in Node JS and thinking of optimal ways to answer research questions given the Sketchy app that I worked on.

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