



SKETCH RECOGNITION LAB TEXAS A&M UNIVERSITY

This blog hosts weekly news about the Texas A&M University Sketch Recognition Lab. SRL is directed by Dr. Tracy Hammond, an associate professor in the Computer Science and Engineering Department. More information about the lab can be found at <http://srl.tamu.edu>

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Raniero Lara-Garduno - First Place in Graduate Poster Contest at 2015 Tapia Conference

The Sketch Recognition Lab, as well as the Lab Director Dr. Tracy Hammond, happily congratulates Raniero Lara-Garduno for being awarded first place in the Graduate Poster Contest at the 2015 Tapia Conference!



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Held over February 18 – 21, the 2015 conference was held in snowy and beautiful Boston, MA.

Lara-Garduno's project, which the winning poster was about, is titled Smart Strokes. It is a platform to digitize neuropsychology tests for more effective and efficient readings. Smart Strokes focused on 'trail tests' – the category of neuropsychology exam that is reminiscent of connect-the-dots.

There are two sub-categories that make up trail tests. The first is based on a simple number system – like a standard connect-the-dots – in which a patient traces an abstract image by following chronological numbers. The second, like the first, is based on the patient tracing an image, but instead of basic numerals, they are tracing in a number-letter pattern: 1, A, 2, B, 3, C, etc. Although the second category is more difficult for the patient, its results are more accurate in testing the cognitive abilities of the person being tested.

These tests are also not normally looked at by the patient's doctor as a means to diagnose, but rather a stimulus on which to base observations of behavior. For example, doctors will note how a patient is holding the pen, how they react to mistakes, how they ask questions, and other identifiers to better understand them.

The tests are also typically done using pencils and paper.

Doctors still rely on the static paper-based tests," Lara-Garduno commented on the traditional testing methods. "Which, in 2015, when pretty much everything is going digital, is a little weird."

Lara-Garduno adds "No one has yet performed computer-aided analysis using sketch recognition and pattern recognition techniques." Moving neuropsychology tests into a more technological form allows for the principles of sketch recognition to be applied. This, in turn, allows the proctors of the exam more recorded information to

draw on during analysis and gives a greater understanding to the results. For example, through sketch technology, a virtual heat map can be created by changing the color of the test every few moments. Upon completion, a doctor can see what part of the test a patient spent the most time on based on the colorization of the test.

"Additionally, using the 'magic' of sketch recognition and data mining, you can find new information about the patient. What I showed in this particular poster, was that I could grab about 29 people and be able to tell whether they are above the age of 50 or below the age of 38."

Furthermore, age recognition is all done without knowing the patient. All Lara-Garduno's program needs to identify a patient's age range is the sketch-test. The ability to put patients into age categories is something that cannot be done using paper tests, but Smart Strokes has a 92% accuracy rate in this particular means of categorization.

While the project and one of his project mentors, Dr. Nancy Leslie, has a background in medical and health sciences, Lara-Garduno does not.

"It is interesting because of the novelty and newness of the space that hadn't been done before," he commented. "It lends itself very well with what has been developed by sketch recognition."

Smart Strokes was originally based off of a capstone project by undergraduate students Laramie Goode, Andy Hurley, Thomas Klingshim, Nick Melnyk, and Josh Rispoli. Lara-Garduno and Dr. Tracy Hammond suspected the project had the potential to be more than a one-semester project. They also agreed that the concept of the program was something that could be pursued in multiple directions, each leading to a new finding and application.

Along with Dr. Hammond, Lara-Garduno was mentored by Dr. Nancy Leslie, a clinical neuropsychologist who works in the Texas Brain and Spine Institute. Dr. Leslie provided a medical background, helpful critiques, and new ideas for the project. Each which supported and aided Smart Stroke's ability to come together. Dr. Leslie wants to eventually integrate this technology into her patient testing routine.

"Clinical items that we might overlook – such as how the directions given or the spacing between nodes on a particular test – can make dramatic differences in the outcome," Lara-Garduno explained when talking about Dr. Linsey's involvement with Smart Strokes. "Dr. Linsey provides the crucial knowledge and expertise to ensure a test that is consistent with current practices."

On the day of the poster presentation, while they are not required to remain anonymous, judges dressed in plain-clothes and normally did not hold the review card when asking about the project they approached. Almost anyone could be a judge, so presenters approached any question as though it was given by a conference official. They asked questions that sometimes cut off further explanation of the project so that they could obtain all the information they needed to make an appropriate judgment for awards.

It is a much more intimate process than many other presentations, for the judge is standing right in front of a presenter, staring at the poster on display, and asking direct questions about the project.

"It wreaks havoc on your throat because you have a thousand other people in the same small room and you have to shout over them," Lara-Garduno added with a smile. "But it's much more energetic. Time goes a lot faster than if you're standing up front and people are just all looking at you awkwardly."



While talking about the judging process and award, Lara-Garduno commented that it felt weird to have won.

"I didn't actually think that I would win," he explained. "This is my first poster presentation in a non-A&M setting. Obviously, the weirdness came down to happiness because it was something that I definitely didn't expect."

The other members of the Sketch Recognition Lab were a community of support and help in polishing Smart Strokes. Lara-Garduno explained the importance of getting the approval of his lab mates, after all, everything that is presented is a reflection of the lab. It's important to make projects the best that they can be when on display.

Looking toward the future of Smart Strokes, Lara-Garduno hopes to get as many people as possible to participate in the testing of the program as well as clean up a few technical difficulties associated with the project – for example, if a patient accidentally grazed an out-of-order number accidentally, the program would count it wrong. Dr. Hammond and Lara-Garduno want the computerized system to react more similarly to a human grader, automatically understanding the intention behind the actions when grading. Such artificial intelligence motivated technical-tweaks will allow Smart Strokes to be a more effective and patient-friendly program.

When asked if he had any more plans to celebrate his award, Lara-Garduno responded with a laugh, "I don't know about celebrations - we certainly went out after the actual ceremony. Fortunately, the hotel was connected to a mall, so we didn't have to leave or freeze, since it was about fourteen degrees outside."

He also extended his gratitude for his fellow members of the Sketch Recognition lab for writing such strong and critical feedback as well as giving him constant encouragement as he worked on creating, testing, and presenting his work on Smart Strokes.

"We are very tightly knit," he concluded. "The conference is named after Dr. Richard Tapia, and he went to the actual conference. He said that caliber of the work and the comradery of the people who represented A&M – and most of us were from the SRL – was very admirable and it definitely stuck with him."

What does Dr. Hammond say about the project? "This is a project that I am very passionate about, so it is nice to know that others see the value as well. I look forward to the application of many sketch recognition techniques to make the computerized version not only an effective replacement for the paper version, but rather a significant improvement, providing doctors with clinical information that readily ascertainable through the paper version."

And about the award? "I am incredibly proud of Raniero and the progress he has made. Tapia is a wonderful place for him to make his research debut."

Posted by [Hannah Conrad](#) at 6:31 PM



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