

Carnegie Mellon, Microsoft scientists use game to generate database for analysis of drawing

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Big Data enables drawing assistance application, new insights

PITTSBURGH—The fingers of thousands of people who created sketches of Brad Pitt and Angelina Jolie on their iPhones can collectively guide and correct the drawing strokes of subsequent touchscreen users in an application created by researchers at Carnegie Mellon University and Microsoft Research.

The app compensates for the "fat finger" problem associated with touchscreens, automatically correcting a person's drawing strokes while preserving the user's artistic style. "Our goal was to make it invisible to the user, so people wouldn't even be aware the correction is taking place," said Alex Limpaecher, a Ph.D. student in Carnegie Mellon's Computer Science Department.

Adrien Treuille, associate professor of computer science and robotics at Carnegie Mellon, said the drawing assistance app is just one example of how Big Data can be used to enhance drawing and writing on touchscreens and even provide deep insights into art and perception. The trick has been to create drawing databases large enough to leverage — an obstacle that he and his research team surmounted with an iPhone drawing game.

The game they created, DrawAFriend, motivated thousands of people to sketch Pitt, Jolie and other celebrities. In its first week, the game generated 1,500 images a day. The game is still operational and the resulting database now includes more than 17,000 images, each with stroke-by-stroke information about how it was created.

"We are in the middle of a Big Data revolution," Treuille said. "We've found that Big Data can be used to do amazing things. But success is not inevitable; you have to have the dataset first. With DrawAFriend, we've found a way to use crowdsourcing to create this critical resource for a data-impooverished phenomenon." Limpaecher will present the team's findings today at SIGGRAPH 2013, the International Conference on Computer Graphics and Interactive Techniques, in Anaheim, Calif. In addition to Treuille, the other team members were Nicholas Feltman, a Ph.D. student in computer science, and Michael Cohen, principal researcher in Microsoft Research's Interactive Visual Media Group.

In DrawAFriend, players take turns drawing faces of celebrities or of mutual friends from Facebook. One player draws the face, tracing over a photo. As the portrait comes together, stroke by stroke, the other player guesses which letters are in the name of the subject of the portrait, much like in the game Hangman.

Limpaecher said the game accomplishes a number of objectives. Not only does it

create a large database of drawing strokes, the game motivates players to try to draw as best they can and also evaluates the quality of the drawing by tracking the success of the other players' guesses.

The team used the database of celebrity photos to create a simple stroke-correction method. By determining the consensus of the strokes from the database drawings, they found that they could cancel out the "noise" caused by large fingers trying to draw on small screens. This correction occurs in real-time so the person is not aware that the drawing is being cleaned up even as it is being created.

Other applications abound. For instance, Limpaecher said algorithms have previously been created for identifying whether a person is drawing a face, or a human figure, or other subject, but large databases have not been available to enable their use. Likewise, the correction function now used for sketches based on photos could be modified for freehand drawing.

To broaden the database, the game could be modified to include drawings other than portrait sketches. Treuille said databases of drawings also could be used to address more basic questions. Drawings often differ substantially in appearance from their real-life subjects, he noted, which suggests that databases of drawings could be mined for insights into human perception. Such findings, in turn, might help in developing better object recognition or scene analysis for computer vision systems.

The databases also might be used to create teaching tools to improve the artistic techniques of students, he added.

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