It started with data—five centuries’ worth of names, dates, and places—chronicling the journeys of Korean brides as they traveled to join their new husbands. Originally handwritten in thick genealogy books called Jokbo and passed down from generation to generation, the now-digital records provided a scant but fascinating picture of the arranged marriages: each bride’s origin, her destination, and the date.

With a giant Excel spreadsheet and two weeks’ time, Daniel Ha and his teammates were given a challenge: come up with a way to visualize the data that is not only informative but also aesthetically pleasing enough to be featured in a gallery exhibition.

“My initial reaction was, this is crazy. There were 100,000 data points for just one family,” says Ha, a junior studying manufacturing and design engineering. “And that was just dealing with the numbers. We hadn’t even tackled the question about how to create something artistic and thought provoking.”

Ha was one of 21 participants in Data as Art, a new collaborative course in which students from Northwestern and the School of the Art Institute of Chicago are tasked with translating complicated information into visual art or images that an average viewer can understand. Cotaught over Summer Session by nine faculty from both institutions, the course is based on the notion that communicating data is essential to the investigative process and can change the way colleagues and the public respond to work.

Data as Art is not Northwestern’s first collaboration with the Art Institute of Chicago; for nearly a decade the two institutions have partnered to scientifically analyze museum masterpieces and to develop new methods and technologies to investigate art. But the course marks the first time that students from both schools—majoring in everything from materials science to print media, applied math to architecture—have collaborated in a structured way on a shared, interdisciplinary project: a public art exhibition.

Art meets science
For the first half of the inaugural course, students learned about computer programming and the history of graphic visualization and undertook a small-scale data collection project using pennies. Then they separated into three teams. Two were provided existing data sets collected by McCormick professors: 15 years of Chicago Public Schools enrollment data from Luis Amaral, professor of chemical and biological engineering, and the Korean genealogy records from Daniel Abrams, assistant professor of engineering sciences and applied mathematics.

In lieu of a data set, the third team—working with Steven Franconeri, associate professor of psychology in the Judd A. and Marjorie Weinberg College of Arts and Sciences—was introduced to eye-tracking technology, often used by social scientists and marketers to gain insight into social interactions and ads’ effectiveness. The team was charged with collecting its own data with a computer screen–mounted device.

Each team was asked to develop three ideas for communicating its data and present them to fellow students and instructors. None of the teams ended up pursuing their first idea, but the process of incorporating feedback was new and beneficial for some of the science students. “In science, you work up to your deadline, and then you present your work,” Amaral says. “Artists do it differently and, some would say, better. They present and get feedback as part of the process, and it can result in a better end product.”

Arranging the data on arranged marriages
When the Korean genealogy team started brainstorming, members wanted a presentation idea that would resonate with people today. Their early concepts strayed from the hard data toward more artistic interpretations. They considered creating a kinetic structure with balls and chutes to represent the brides’ journeys, but the massive amount of work required wasn’t feasible in the two weeks remaining. Their second idea was interactive: viewers would chew gum while looking at a wall of pictures of fictitious Korean brides or photos of people from modern Korean dating websites, then use their chewed-up gum to connect couples they believed would be a good match. “It was a beautiful concept,” says
Visitors examine “Chicagos,” one of three exhibits to result from the inaugural Data as Art course. The course tasked art and engineering students with transforming information into visual art, which was displayed at the School of the Art Institute of Chicago.
Tiffany Holmes, SAIC’s interim dean of undergraduate studies, “one that touched on the fragility of the experience of being matched with someone you don’t know.”

But after a feedback session (“It might stink and could be disrespectful,” was one comment), the team decided to go in another, more data-centered direction. The students narrowed their focus to one Korean clan of the ten for which it possessed Jokbo data. Using the Processing programming language, members created an animation that showed, year by year, the origin and ending point for each bride marrying into the clan. Accompanying the animation was a display of thousands of pink paper airplanes to illustrate the volume of arranged marriages. Each represented 100 unions.

**A social question visualized**

For the school enrollment team, creating visual representations of data resulted in not only art but also a new way of viewing an important social issue: school choice.

Allowing families to choose schools, even those outside regular neighborhood boundaries, is sometimes championed as one solution to Chicago’s public-school problems. But, the team asked, is traveling to another school a good choice for all students?

The team decided to supplement the high school transfer data it had been given with census data, school test scores, and Chicago Transit Authority data—all information readily available to the public. With these multiple data sets, team members wrote code to create a series of temporal maps, one for each public high school. The maps demonstrated the ease or difficulty with which students could travel to schools outside their neighborhoods: the bigger the area, the longer the travel time. Other data integrated into the map suggested whether transferring schools would provide an advantage or disadvantage. Circles on the maps represented other high schools, and arrows inside a circle indicated whether that school’s standardized test scores were higher or lower than the original school’s.

In the exhibition, the maps covered the walls of an SAIC gallery space. In the center of
the room, a 3D contour map indicated neighborhoods’ connectedness, and slides projected from above overlaid the structure with demographic information like crime rates and race. Higher elevations indicated neighborhoods that had better public transit connections to the rest of the city. “It’s the idea of being in a valley versus being on a mountain,” says SAIC master’s student Richard Blackwell. “The higher you are up the mountain, the easier it is to ski down. The farther down you are in a valley, the harder it is to climb out.”

It was clear from the maps that school choice wouldn’t be a blanket solution. “Chicago is not a singular experience,” says Nicholas Timkovich, a graduate student in Northwestern’s Inter-departmental Biological Sciences Graduate Program. “We wanted to show that.”

Examining gaze
The eye-tracking team members were in agreement that they wanted their art to be interactive, but as soon as they started brainstorming, the disagreements began. “For the first two weeks, all the Northwestern students wanted to do was read papers and research,” says SAIC senior Shutong Zheng. “The SAIC students wanted to start with our inspirations and branch out from there.” Forging ahead, members considered an examination of gaze in public versus private space and a study of males versus females, but eventually decided to investigate how people view themselves through “selfies,” informal self-portraits typically taken with a cellphone and shared via social media.

For their project, “Me, My#selfie, and Eye,” they snapped as many as 100 self-portraits each to get them right; then they opened the portraits on a computer screen and tracked their eye movements as they looked at them. The revised portraits showed their eye movements through lines and circles superimposed over their faces. The students also developed an interactive kiosk in which exhibition-goers could take their own selfies on a computer screen while the eye-tracker “watched,” marking the digital photos with a web of criss-crossing lines. The resulting photos were tweeted at @MeMyselfieEye.

Using public school data, census numbers, and public transit information, the “Chicagos” team wrote code to create a series of temporal maps that showed how easy or difficult it is for transit users to reach other parts of the city. The project, which also incorporated school test scores and featured a 3D contour map, sought to explore the issue of school choice.
Finding common ground

Data as Art asked students to branch into fields outside their comfort zone, collaborating with partners who think and work differently. The students’ differences were apparent from the beginning, says Bruce Ankenman, one of the course creators. He points to the concept of variation. “Engineering students tend to think of variation as a bad thing—consider manufacturing processes or lab experiments, for example. We strive for consistency,” says Ankenman, associate professor of industrial engineering and management sciences. “On the other hand, art students want to understand the individual instead of the group. They want variation.”

But that conflict is precisely the point, says McCormick Dean Julio M. Ottino. “When I proposed that Northwestern and the Art Institute create this course, I hoped to produce a clash of cultures and thinking styles. I am pleased to say we succeeded,” he says. “Creativity is essential in science and technology just as it is essential in the arts. To succeed, engineers must be able to communicate not only with people from different backgrounds, but with our own ‘right brains.’”

On August 16, students and faculty gathered in an SAIC gallery for a final critique of one another’s work, followed by an opening reception for the exhibition Data Viz Collaborative. Leaders from both schools applauded the finished products and the process. The students’ projects were displayed in the exhibition in two SAIC galleries in August and September. The art then moved to Northwestern, where select pieces remain on display at the Segal Design Institute in McCormick’s Ford Motor Company Engineering Design Center.