Multidisciplinary study reveals big story of cultural migration (w/ Video)

July 31 2014

The visualization of birth-death network dynamics offers a meta-narrative of cultural history: Europe 0-1856 CE. Credit: Maximilian Schich & Mauro Martino, 2014

Quantifying and transforming the history of culture into visual representation isn't easy. There are thousands of individual stories across

millennia to consider, and some historical conditions are nearly impossible to measure.

Addressing this challenge, Dr. Maximilian Schich, associate professor of arts and technology at The University of Texas at Dallas, has brought together a team of network and complexity scientists to create and quantify a big picture of European and North American cultural history.

Schich, an art historian who works under the umbrella of the University's Arts and Technology (ATEC) Program, has reconstructed the migration and mobility patterns of more than 150,000 notable individuals over a time span of two thousand years. By connecting the birth and death locations of each individual, Schich and his team have made progress in our understanding of large-scale cultural dynamics.

Schich's research is detailed in the article "A Network Framework of Cultural History," published Aug. 1 in the journal *Science*.

"The study draws a surprisingly comprehensive picture of European and North American cultural interaction that can't be otherwise achieved without consulting vast amounts of literature or combing discrete datasets," Schich said. "This study functions like a macro-scope, where quantitative and qualitative inquiry complement each other."

Quantitative analysis involves objective, measureable data, while qualitative inquiry relies on subjective or "apparent" qualities.

Schich and his colleagues collected the birth and death data from three databases to track migration networks within and out of Europe and North America, revealing a pattern of geographical birth sources and death attractors.

A key finding in the study, Schich says, is that non-intuitive fundamental

patterns, including the so-called "laws of migration," emerge from large numbers of specific events. The team also found evidence for massive fluctuations on a level of single specific locations.

"In practice, this means that cultural history is both an event discipline, where qualitative inquiry focuses on the specific, and a law discipline, where quantification helps to understand general patterns," Schich said.

Other findings show that despite the dependence of the arts on money, cultural centers and economic centers do not always coincide, and that the population size of a location does not necessarily point to its cultural attractiveness.

"In fact, outliers with outstanding cultural attraction, such as Hollywood, Calif., where we find 10 times more notable deaths as births, are found at all sizes, from villages to metroplexes," Schich said.

In addition, the median physical distance between birth and death locations changed very little between the 14th and 21st centuries, from about 214 kilometers (133 miles) to about 382 km (237 miles), respectively.

"There is really no average or typical cultural center," Schich added. "As a consequence, cultural historians really need quantification to complement their intuition based on qualitative inquiry. On the other hand, our results also send a message to complexity scientists. The massive fluctuations we find mean that qualitative inquiry has to complement quantification in order to fully understand the dynamics of cultural migration."

Schich said the topic of art and cultural history is an uncommon topic for papers in journals such as *Science*.

"A large amount of multidisciplinary expertise was necessary to arrive at the results we found," Schich said. "The paper relies on the fields of art history, complex networks, complexity science, computational sociology, human mobility, information design, physics and some inspiration from systems biology."

While the research that made the paper possible began in Boston and was continued in Zurich, Switzerland, Schich finished his project in Texas.

"The ATEC program at UT Dallas provides an environment where it is possible and encouraged to transcend disciplinary boundaries to understand culture as a complex system. This paper illustrates perfectly the type of work that is taking place in my Cultural Science Lab," Schich added.

More information: *Science*, 2014. www.sciencemag.org/lookup/doi/… 1126/science.1240064

Provided by University of Texas at Dallas