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in collaboration with

- Microsoft Research Beijing
- Guangzhou Ruifeng Co. Ltd

Interactive Visual Knowledge Aggregation

Old and New Silk Roads as a Showcase for Challenges in
Social Media Technologies, Communication, and Informatics

Athens, October 10, 2017

Beijing, Microsoft Research Asia October 10, 2014

Kick off meeting to start the project “Augmenting Microsoft Bing Search through Automatic Narratives in the Interactive Global Histories” (Microsoft Research Grant, PI Andrea Nanetti, Co-PI Siew Ann Cheong at NTU and Chin-Yew Lin at MSRA, Sept. 2014 – June 2015)

9:00-9:30 Opening by Chin-Yew, Andrea, and Siew Ann)

9:30-12:30 The invitees present their databases

- Angelo Cattaneo (Renaissance Maps of Asia)
- Stefano Bertocci and Sara Porzilli (Michelangelo as a visual gateway to digital data)

14-17 Open the discussion and write a working agenda

- 1) solutions to connect other databases to the Engineering Historical Memory (EHM)
- 2) use Bing to connect scholarly databases to Wikipedia and other relevant information sources through the experimental ontology proposed by EHM



**Guangzhou Ruifeng Culture &
Communication Co., Ltd.
September 2, 20147**

Meeting to discuss the project on
projection mapping for the 2017 Guangzhou
International Light Festival

**PRODUCTION CREDITS ELLIPTIC DOME ANIMATION
"THE SILK ROADS"**

Production (Ruifeng, NTU, and GAFA)

Producer/Writer: Andrea Nanetti

Director: Hannes Rall

Dome Theatre Consultant: Ben Shedd

Visual Concept and Layout Film: ShenShen Luo

Storyboards: Hannes Rall

Technical advisor: Benjamin Seide

Visual development and digital painting: Chua Tin Giap
Calvin

Visual development, digital painting and character
animation: Tessa Low Yun

Visual development, motion graphics design and
animation, scenes 9-16: Jochen Rall



09/10/17

Triplets (threefold distinctions)

Hannah Arendt, *The Human Condition*, Introduction by Margaret Canovan, p. vii. Chicago and London: The University of Chicago Press.

“Hannah Arendt is preeminently the theorist of beginnings. All her books are the tales of the unexpected ..., and reflections on the human capacity to start something new pervade her thinking ... Often the way she sheds light into neglected corners of experience is by making new distinctions, many of them threefold, as if conventional dichotomies were too constricting for her intellectual imagination. *The Human Condition* is crammed with distinctions: between labor, work, and action; between power, violence, and strength, between the earth and the world; ...

playing triplets

Liberal arts, Fine Arts, Humanities

triplet

Liberal Arts

1. Academic disciplines, including literature, history, languages, philosophy, mathematics, and general sciences; intended to provide general knowledge and intellectual skills (rather than occupational or professional skills) .
2. (During the Middle Ages) the disciplines comprising the *trivium* and *quadrivium*.

Humanities

The word *humanitas* was coined by Cicero (106-43 BCE) to describe the study of classical literature, especially poetry, in the formation of an ideal public servant (*orator*). During the Renaissance, Cicero's injunction to cultivate 'studia humanitatis' was understood as: grammar, rhetoric, poetry, history, and moral philosophy.

Fine Arts

- 1 creative arts, especially visual arts, whose products are to be appreciated primarily or solely for their imaginative, aesthetic, or intellectual content: *the convergence of popular culture and fine art*.
- 2 an activity requiring great skill or accomplishment: *he'll have to learn the fine art of persuasion*.

Triplet

Drawing

a **picture or diagram** made with a pencil, pen, or crayon rather than paint, especially one drawn in monochrome:

Animation

the technique of photographing **successive drawings** or positions of puppets or models to create an illusion of movement when the movie is shown as a sequence

Illustration [a meaningful insight]

a picture illustrating a book, newspaper, etc.:

- an example **serving to clarify or prove something**
- the action or fact of illustrating something, either pictorially or by exemplification

Illustrate: in the sense 'illuminate, **shed light on**'

Visualization: Optimisation (Computer engineering)

Visualisation [the simple representation]

- the representation of an object, situation, or set of information as a chart or other image
- the formation of a mental image of something

Visualize:

1817, first attested in, and perhaps coined by, Coleridge (dictionary.com)

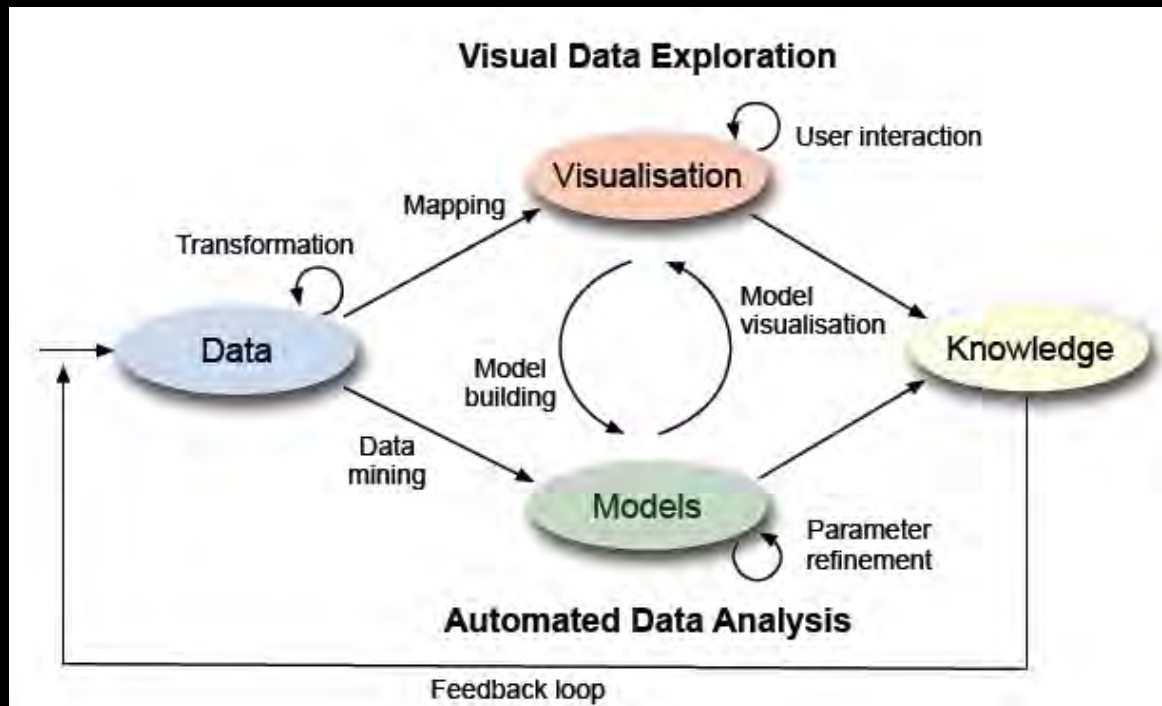
Computer Graphics

visual images produced by computer processing.

Computer Animation

the manipulation of electronic images by means of a computer in order to create moving images.

The Visual Analytics Process



The visual analytics process is characterised through interaction between data, visualisations, models about the data, and the users in order to discover knowledge

P10

The visual analytics process aims at tightly coupling automated analysis methods and interactive visual representations.

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Keim, Daniel, Jörn Kohlhammer, Geoffrey Ellis, and Florian Mansmann (eds.). *Mastering the Information Age Solving Problems with Visual Analytics*. Goslar, Germany: Eurographics Association, 2010

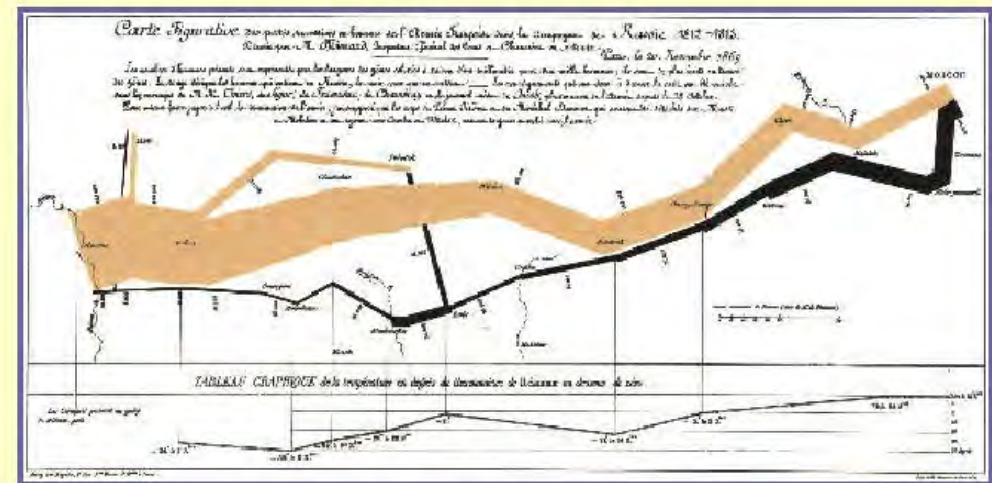
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(VISUAL) KNOWLEDGE AGGREGATION ≠ INFOGRAPHICS



Fra Mauro Map of the World (ca.1450). Venice, Marciana Library
Source: Wikipedia. CC-PD-Mark
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Proto-GIS: Napoleon's march to Moscow



Drawn by Charles Joseph Minard in 1861; reputed to be the best statistical graphic ever drawn.



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- 三幅地图，三个时代，三种风格



Knowledge Aggregation in Decision Science

Andrea NANETTI, Angelo CATTANEO, Siew Ann CHEONG, Chin-Yew LIN, *Maps as Knowledge Aggregators: from Renaissance Italy Fra Mauro to Web Search Engines*, in «The Cartographic Journal» (© The British Cartographic Society), special issue, 52/2 (May 2015), [published on 26 November 2015], pp. 159-167.

In the knowledge management literature, we find the classification of human awareness into a *data, information, knowledge, and wisdom* (DIKW) hierarchy (Ackoff, 1989; Berlinger et al., 2004; Rowley, 2007). According to Ackoff (1989), data are merely symbols that we associate with specific features in the outside world, information is contextualized data that allows us to answer questions, knowledge is proceduralized information that allows us to act on and solve problems, and wisdom is knowing under which situations to act. To do well in the world we must move up this hierarchy of knowing, and the greatest challenge we face is the fragmentation of knowledge and information. In other words, the problem we have to overcome is the problem of *knowledge aggregation*, encountered in decision science (Roy, 2005), organizational learning (Grant, 1996; Grundspenkis, 2007), and even bioinformatics (Belleau et al., 2008; Miotto et al., 2008) and medicine (Hahn et al., 1999; Malterud, 2011; McDonagh et al., 2011).

The Silk Road as a case study for heritage science

A NEW SCIENCE

at the Interface of

(Digital) HUMANITIES and (Data) SCIENCE

Where data are THE data

(i.e. Treasure of Human Experiences data)

THE VISION:
Understanding
FROM WHERE we come from
we understand
WHO WE ARE

Understanding WHERE we are NOW
we MIGHT influence
WHAT we want to become

What the World's Emptyest International Airport Says About China's Influence, by Brook Larmer

The four-lane highway leading out of the Sri Lankan town of Hambantota gets so little traffic that it sometimes attracts more wild elephants than automobiles. The pachyderms are intelligent — they seem to use the road as a jungle shortcut — but not intelligent enough, alas, to appreciate the pun their course embodies: It links together a series of white elephants, i.e. boondoggles, built and financed by the Chinese. Beyond the lonely highway itself, there is a 35,000-seat cricket stadium, an almost vacant \$1.5 billion deepwater port and, 16 miles inland, a \$209 million jewel known as “the world’s emptyest international airport.”

Mattala Rajapaksa International Airport, the second-largest in Sri Lanka, is designed to handle a million passengers per year. It currently receives about a dozen passengers per day. Business is so slow that the airport has made more money from renting out the unused cargo terminals for rice storage than from flight-related activities. In one burst of activity last year, 350 security personnel armed with firecrackers were deployed to scare off wild animals, the airport’s most common visitors.



The New York Times Magazine, 13 Sept. 2017

Immersive Interactive Knowledge Aggregation



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Andrea Nanetti received his university education in Medieval and Renaissance studies between 1986 and 2000 in Italy (University of Bologna), France (University of Paris I-Sorbonne and Paris X Nanterre), Germany (University of Cologne), Greece (National Hellenic Research Foundation), and USA (Brown University), where he has been instructed by world's leading professors to work on research questions and solutions through the cross-fertilization of different methodologies (historical, philological, diplomatic, aesthetic, anthropological, and computational). As a scholar—who started his research vocation in historical studies at the advent of computer operating systems with graphical user interfaces—he has always been fascinated by the exponential growth of interdependencies between artificial actions (i.e., made by humans) and computational operations (i.e., completed by electronic devices able to store and process data, typically in binary form, according to instructions given to them in a variable program) in terms of both quantity and quality. With this interest, he is proposing the theoretical need to direct traditional disciplinary knowledge towards a formal science of heritage able to study what kind of data and information—now encoded in complex interactions of written, pictorial, sculptural, architectural, and digital records, oral memories, practices, and performed rituals (i.e., the treasure of human experiences)—may be inherited by machine learning algorithms. Dr. Nanetti lives with his family in Singapore, at Nanyang Technological University, where he is Associate Chair (Research) in the School of Art, Design and Media, Senior Research Team member in the Complexity Institute, with a courtesy appointment in the History Programme.

Selected publications:

Andrea NANETTI and Siew Ann CHEONG, *Computational History: From Big Data to Big Simulations*, in Shu-Heng CHEN (Ed.), *Big Data in Computational Social Science and Humanities*, Springer Series on “Computational Social Sciences”. Invited for submission in October 2015. Submitted for publication in January 2017. Forthcoming.

WenYuan LIU, Andrea NANETTI, Siew Ann CHEONG. *Knowledge Evolution in Physics Research: An Analysis of Bibliographic Coupling Networks*, in «arXiv preprint», Vol. 4/4 (2017) arXiv:1704.00875, and in PLoS ONE 12 (9): e0184821.

<https://doi.org/10.1371/journal.pone.0184821>.

Andrea NANETTI, Chin-Yew LIN, Siew Ann CHEONG. (2016). Provenance and Validation from the Humanities to Automatic Acquisition of Semantic Knowledge and Machine Reading for News and Historical Sources Indexing/Summary. *The Asian Review of World Histories*, 4/1(Jan. 2016), 125-132.