Introduction

Computational Social Intelligence - Lecture 01

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Outline

- Introduction
- The Theory of Multiple Intelligences
- Types of Intelligence
- Social Intelligence and Computing
- Conclusions

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Course Teacher

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Timetable

SEPTEMBER 2018

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

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OCTOBER 2018

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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NOVEMBER 2018

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

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- The course will last for 10 weeks
- Thursday: 9.00-11.00
- Thursday:14.00-15.00

Course Material

- All the course material (slides, texts, etc.) is available on the Moodle page of the course:

  http://website

- The slides are not a textbook, you need to study the texts that will be provided during the course.

Evaluation

- The course involves an Assessed Exercise that accounts for 20% of the final mark;
- The course includes 10 hours (out of 30) that will be dedicated to the Assessed Exercise;
- The exam accounts for 80% of the final mark.

Interdisciplinarity

- The course is interdisciplinary and it includes not only computing science, but also social psychology;
- The acquisition of social psychology and psychometric notions is crucial towards the successful completion of the course.

Methodology

- The course is methodologically oriented, it requires one to solve problems and to understand the theory behind the solutions;
- The course adopts mathematical and statistical methodologies like those taught, e.g., in the course “Machine Learning”.

Syllabus

- The course is research oriented and the syllabus includes research papers (available on Moodle) that need to be studied in view of the exam;
- The research papers to be studied are explicitly mentioned at the beginning of every lecture.

Role of Programming

- The course requires the use of programming, but it will not improve your knowledge of programming, it will teach you how to address new problems with programming;
- Programming contributes only to a limited extent to final mark;
- No coding examples will be provided.

Recap

- The course does not target the mere acquisition of technical skills, it requires the development of a scientific attitude;

- Every lecture requires one to study different types of material (including scientific articles);

- Code and coding are a tool and not a goal, the course is not based on coding examples and does not target software development.

Part I: Behaviour Observation

Design and organise the collection of behavioural data in view of the application of statistical and computational methodologies for human behaviour understanding.

- Methodology: Statistical Testing;
- Psychology: Behaviour Observation;
- Practical: Nonverbal Cues in Conversation.

Part II: Psychometrics

Measure social and psychological constructs - in quantitative terms - through the adoption of standard psychometric questionnaires.

- Methodology: Correlation and Associations
- Psychology: Psychometric Questionnaires
- Practical: Speech and Personality

Part III: Behaviour Understanding

Apply basic statistical methodologies (e.g., k-Means and Naïve Bayes Classifier) to automatically map behavioural observations into social and psychological constructs.

- Methodology: Bayesian Decision Theory
- Psychology: Human-Human Communication
- Practical: Smile Detection

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This lecture is based on the following text (available on Moodle):

- Davis et al., "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

The Theory of Multiple Intelligences

"[…] individuals possess eight or more relatively autonomous intelligences [and] draw on these intelligences [to] solve problems that are relevant to the societies in which they live."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

1.Isolation

"[…] certain individuals should demonstrate particularly high or low levels of a particular capacity in contrast to other capacities."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

2.Specific Neural Structure

"[…] its neural structure and functioning should be distinguishable from that of other major human faculties."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

3.Distinct Development

"It should have a distinct developmental trajectory […] different intelligences should develop at different rates and along paths which are distinctive."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

4.Evolutionary Basis

"[…] an intelligence ought to have a previous instantiation in primate or other species and putative survival value."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

5.Symbolic Systems

"It should be susceptible to capture in symbol systems, of the sort used in formal or informal education."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

6.Measurability

"It should be supported by evidence from psychometric tests of intelligence."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

7.Experimental

"It should be distinguishable from other intelligences through experimental psychological tasks."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

8.Specific Processes

"[…] there should be identifiable mental processes that handle information related to each intelligence."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

Recap

- There are at least eight criteria that must be respected for a particular ability to be accepted as a type of intelligence;
- The criteria address observable aspects of intelligence (evolution, development, brain, psychology and behaviour);
- The criteria ensure that the different types of intelligence are independent.

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1.Linguistic

"An ability to analyse information and create products involving oral and written language such as speeches, books, and memos."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

2.Logical-Mathematical

"An ability to develop equations and proofs, make calculations, and solve abstract problems."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

3.Spatial

"An ability to recognise and manipulate large-scale and fine-grained spatial images."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

4.Musical

"An ability to produce, remember, and make meaning of different patterns of sound."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

5.Naturalist

"An ability to identify and distinguish among different types of plants, animals, and weather formations that are found in the natural world."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

6.Bodily-Kinesthetic

"An ability to use one's own body to create products or solve problems."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

7.Interpersonal

"An ability to recognise and understand other people's moods, desires, motivations, and intentions."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

8.Intrapersonal

"An ability to recognise and understand one's own moods, desires, motivations, and intentions."

Davis, Christodoulou, Seider & Gardner, "The theory of multiple intelligences", in "Cambridge Handbook of Intelligence", Sternberg & Kaufman (eds.), 485-503, Cambridge University Press, 2011.

Recap

- The application of the eight criteria leads to identification of eight types of intelligence;
- Social intelligence is the name the literature adopts for what the Theory of Multiple Intelligences calls interpersonal intelligence;
- Social intelligence is the skill underlying effective social interactions.

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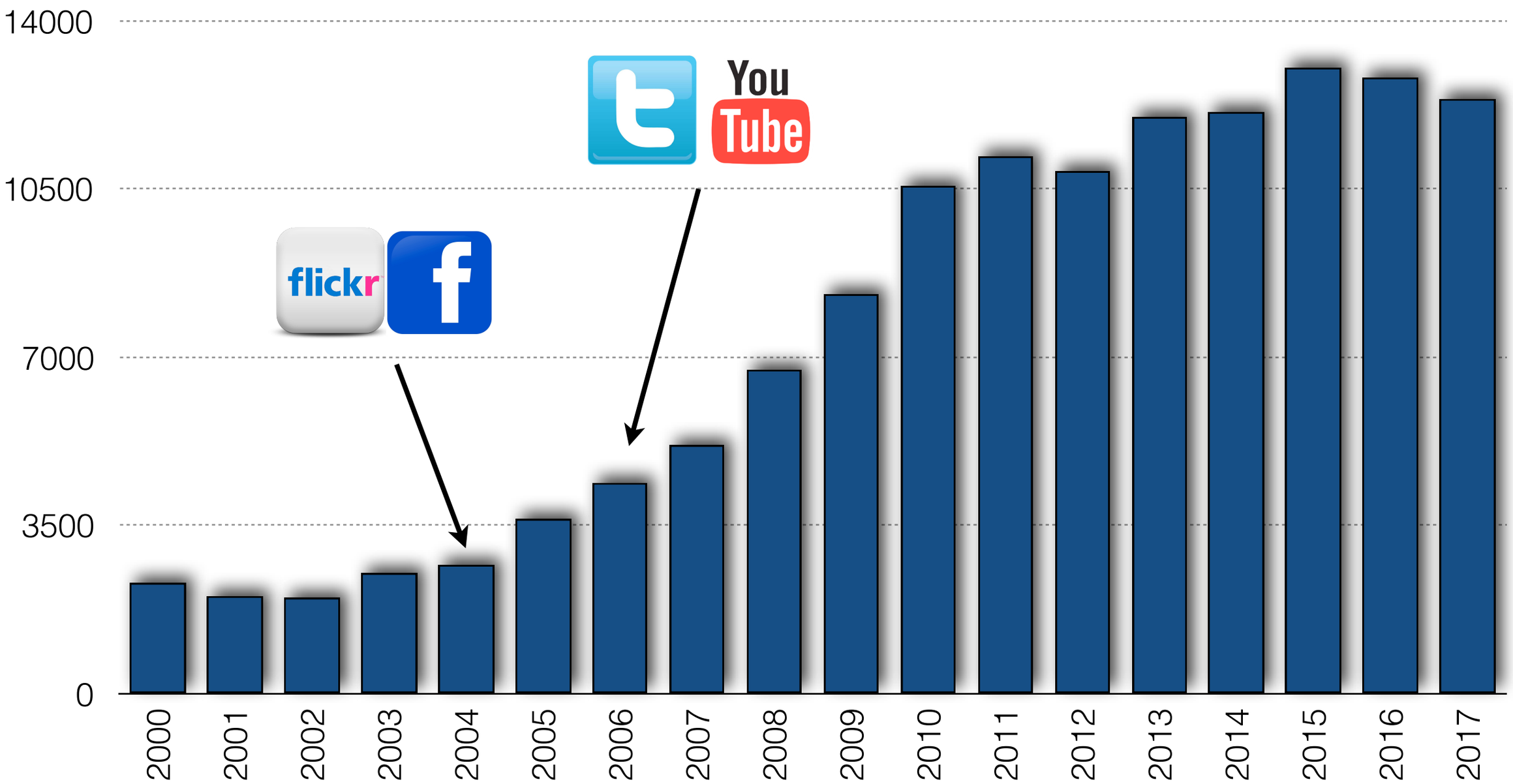

Number of publications that contain the word "social" in the largest publication repositories (ACM Digital Library and IEEEXplore).

Social Intelligence and Computing?

"If AI systems are indeed ever to walk among us, they'll have to be able to understand that each of us has thoughts and feelings and expectations [and] they'll have to adjust their behaviour accordingly."

Hintze, "The four types of AI: what you need to know", 2016, https://www.weforum.org/agenda/2016/11/the-four-types-of-ai-what-you-need-to-know

Social Intelligence and Computing?

"And new research into social robots - that know how to collaborate and build working alliances with humans - means that a future where robots and humans work together, each to do what it does best - is a strong likelihood."

Meyerson, "Top 10 emerging technologies of 2015", 2015, https://www.weforum.org/agenda/2015/03/top-10-emerging-technologies-of-2015-2/#next-robotics

Social Intelligence and Computing?

"tasks that are difficult to automate [...] will require [...] social intelligence."

UK Government Office for Science, "Artificial intelligence: opportunities and implications for the future of decision making", 2015, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/566075/gs-16-19-artificial-intelligence-ai-report.pdf

Social Intelligence and Computing?

"[…] the [next] wave of computerisation will depend on overcoming the engineering bottlenecks related to creative and social intelligence."

Frey and Osborne, "Oxford Martin Programme on the Impacts of Future Technology", 2013, https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Social Intelligence and Computing?

"[…] machines that completely mimic, or even improve upon the human physical form, but are socially as limited as theme park animatronics [or, vice versa,] devices that have no physical dexterity, but are very social"

KPMG, "Social Robots", 2016, https://assets.kpmg.com/content/dam/kpmg/pdf/2016/06/social-robots.pdf

Information Retrieval Natural Language Processing Google YAHOO! amazon	**Linguistic**
Expert Systems Theorem Proving IBM ORACLE®	**Logical-Mathematical**
Self Driving Cars Google TESLA	**Spatial**
Music Retrieval Spotify® SHAZAM	**Musical**
Computer Vision COGNEX	**Naturalist**
Robotics Boston Dynamics rethink robotics.	**Bodily-Kinaesthetic**
Artificial Agents Social Media ALDEBARAN SoftBank Group Furhat ROBOTICS	**Interpersonal**
Affective Computing :) Affectiva	**Intrapersonal**

Recap

- The ultimate goal of Computational Social Intelligence (CSI) is to build socially intelligent machines;
- CSI is a subfield of Artificial Intelligence characterised by specific scientific and technological goals;
- It responds to economic and industrial needs stated by think tanks, companies and strategic institutions.

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Conclusions

- Computational Social Intelligence encompasses computing technologies dealing with human-human and human-machine interactions;

- It is an interdisciplinary domain that requires both psychology and computing;

- It includes the analysis of social / psychological phenomena in observational data and the synthesis of social behaviour.

Thank You!