Computational Creativity

Data Science Master’s Programme
Department of Computer Science, University of Helsinki

Fall 2017

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First lecture, 30 Oct 2017

- Introduction to computational creativity
- Learning objectives of the course
- Working methods of the course

- Material to read (see course home page for full citation information and links):
  - Ventura: How to build a CC system
  - Jordanous: Four PPPPerspectives on computational creativity (Sections 1 and 2 only)
An introduction to Computational Creativity

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Poemcatcher tests "Brain Poetry" machine
Frankfurt Bookfair 2015
Computational creativity

- Creative computers, machine creativity
- Computers supporting human creativity
- Studies of creative computational processes

Image Copyright 1976 by Creative Computing
– Turing et al, 1950s: generation of music
– How to express visually the idea that “electricity is green (ecological)”?
Examples: Generative art

From Ping Xiao and Simo Linkola: Vismantic: Meaning-making with Images, ICCC 2015
A punning riddle:

- What do you call a murderer with fibre?

- A cereal killer.

By JAPE (Greame Ritchie and others)
What is (computational) creativity?
Defining creativity

– Many definitions. A representative one:

“Creativity is the ability to come up with ideas or artefacts that are new, surprising, and valuable.”
- Boden 1992

– Often just novelty and value

– Note: in this course, “idea” ≈ ”concept” ≈ “artefact” = the product of creation
– Connect the nine dots with four straight lines, without lifting the pen
Three types of creativity (Boden 1992)

1. *Combinational*: new combinations of familiar ideas
   - *input*: ideas; *output*: variations of ideas in the input

2. *Exploratory*: generation of new ideas by exploration of a space of concepts
   - *input*: a search space; *output*: points in the space

3. *Transformational*: involves a transformation of the search space so new kinds of ideas can be generated
   - *input*: a search space; *output*: points in a modifies space
P-creativity vs. H-creativity
(Boden 1992)

A different distinction between creations:

– *P-creativity* or psychological (or personal) creativity: novel just to the agent that produces it

– *H-creativity* or historical creativity: creativity that is recognized as novel by society

– In machine creativity research, emphasis is on p-creativity, i.e., the system be able to produce something novel to itself.

– H-creativity can then, in principle, be achieved with a database of existing artefacts
Four Perspectives on Creativity

What do we actually talk about when talking about creativity?

– Person/Producer
  – Creative traits, e.g. curiosity, persistence, skill, imagination

– Process
  – Stages/subtasks, e.g., ideation, development, refinement

– Product
  – Properties of artefacts, e.g., novelty, surprise, value, beauty, fitness

– Press
  – Influence of, and reception by the environment/society, e.g., feedback, communication, reviews, adoption
What is computational creativity?

Computational creativity is the philosophy, science and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be creative.

- Colton and Wiggins 2012
Computational creativity – why on earth?

- An ultimate AI challenge
- A test bed for AI methods
- Applications
  - Games
  - User interfaces, usability
  - Applications where human creativity is not feasible, e.g., instant creativity
  - Support of human creativity
- An intellectual challenge

Image from the cover of "Creative Computer Graphics" by Jankel and Morton, copyright Cambridge University Press 1984
About the course
Status of the course

- 5 credits
- Mon, Wed, Fri: 2-4 pm
- Part of the data science MSc programme
- Open to students from other programmes
- Prerequisites:
  - programming skills
  - basics of probability calculus
  - (if you manage the first week you will be fine)
  - (knowing and applying ML can make it more fun)
Practical information

– See course homepage at https://courses.helsinki.fi/en/data15002/119122268 for (links to)
  – overview of the course
  – learning objectives
  – working methods of the course
  – assignments, materials and project instructions

– Important links (available on the homepage):
  – a github repository for exercises plus additional material
  – all assignments are returned via Moodle.