Lecture 16: Authoring Systems and Autonomous Creativity

CM 148
Kathleen Tuite

ktuite@ucsc.edu

May 6, 2015
Some history of AI

• Around Palo Alto in the 60s:

• John McCarthy
  – Stanford Artificial Intelligence Laboratory

• Doug Engelbart
  – Augmentation Research Center/Augmented Human Intellect Research Center
John McCarthy
Doug Engelbart
Competing AI Visions

• Engelbart:
  – Augment human intellect
  – Use computers to make humans better at thinking/doing

• McCarthy:
  – Come up with a working artificial intelligence, a “superbrain”
  – A computer that is intelligent on its own
Authoring systems within the context of this rift in AI

• Augmenting human intellect (Engelbart):
  – IDEs
  – Special tools for authoring specific kinds of stories/art/games/content
  – Design assistants
  – Examples
    • Game engines: Unity
    • Authoring IDEs: Inform 7, Unity
    • Semi-automated authoring tools: UNIVERSE, Game-o-Matic

• Creating artificial intelligence (McCarthy):
  – Systems that are intelligent on their own
  – Systems that can be creative on their own
  – Questions:
    • Should AI attempt to build systems that operate the way people do?
    • Can a machine be creative?
  – Examples:
    • Cyc
    • Minstrel (story generator)
    • Art robots (probably have a more official name)
How to build a brain in a vat

- Cyc, a project of Douglas Lenat started in 1984
- Objective:
  - Codify, in machine-usable form, millions of pieces of knowledge that compose human common sense
  - Build up a knowledge base (KB) of facts
    - "Bill Clinton belongs to the collection of U.S. presidents"
    - "All trees are plants"
    - "Paris is the capital of France."
Some examples of Knowledge Bases

- **WordNet**
  - Large, lexical database of English
  - Nouns, verbs, adjectives and adverbs are grouped into sets of cognitive synonyms

- **ImageNet**
  - Image database organized according to the WordNet hierarchy (nouns only)
Google’s Knowledge Graph
IBM’s Watson
Watson on Jeopardy
Can AI be creative?

• What is creativity?
  – A creative solution must be novel and useful

• Csikszentmihalyi: A creative solution must be novel and have value
  • Value determined by the gatekeepers of the discipline

• Is AI creativity be a model human creativity? Should it be?
Harold Cohen’s AARON
Drawing Contraptions
Patrick Tresset’s Drawing Robots
The Painting Fool (by Simon Colton)
eDavid
(Drawing Apparatus for Vivid Image Display)
Different Styles of eDavid
David Cope (UCSC) and the Algorithmic Composer

• EMI (Experiments in Musical Intelligence) software
  – Analyze a composer’s music and generate a new piece that sounds like that composer

• Emily Howell software program
  – Models musical creativity
  – “Hears” feedback from listeners and builds its own musical compositions from a source database
Scott Turner’s Minstrel

• A story generation system for generating King Arthur stories
• Can read 1-2 stories and generate 10 new ones
• Models the creative process
• More on Minstrel on Friday

• Should we model AI creativity after human creativity? Can AI have its own kind of creativity?
COLLABORATIONS WITH MY OTHER SELF

HAROLD COHEN
Discussion of machine creativity

• Should machine creativity model human creativity?
• How can you know if a machine is being creative?
• What are some creative domains you’d like to see AI try to explore?
Class Logistics

• Midterm due in one week

• Required reading for Friday:
  – Chapter 2 of Turner’s *The Creative Process*
  – Find me an interesting twitterbot