A Poststructuralist Perspective on Computer-Generated Literature

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Computer-Generated Literature
→ Artificial Intelligence (AI)
→ Natural Language Processing
→ Natural Language Generation (NLG)
Classifications of Natural Language Generation (NLG) systems

Considering the degree of new, unpredicted information in the generated text

- Systems that can generate even long texts starting from an existing source
  - Machine translation,
  - Automatic summarization
  - Weather forecasts or sports reports
- Question-answering systems
- Writing narratives or poems - texts that are appreciated by humans as including original elements, a result of a creative process

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http://rochi.utcluj.ro/ijusi/issues/2019/no-1#article_3
Classifications of Natural Language Generation (NLG) systems (cont.)

Considering:
- The source of the machine-generated text
- The structuring of discourse
- The technological approach - AI
  - Symbolic
    - Grammars
    - Story schemata
    - Planning
  - Sub-symbolic
    - Machine/deep learning – Neural Networks

Stefan Trausan-Matu - HaPoC 2022, Zurich
22-Nov-21
Theories of stories used in NLG

- Vladimir Propp - morphology of folk stories (1927)
  - a story is: “a description of the tale according to its component parts and the relationship of these components to each other and to the whole” (Propp, 1968)
- Rumelhart – story grammars
- Genette (1972), Jauss
Bailey classification of story generation systems (1999)

- Based on character simulation ("character-centric"): Tale-Spin (Meehan 1977a, 1977b, 1981) and Virtual Storyteller (Theune et al., 2003);

- Focused on the author: MEXICA (Perez, 1999; Perez and Sharples, 2001, 2004) - attempts to model the author’s thinking during the writing of a story;

- Story-based systems: Fabulist (Riedl and Young, 2006).
Another classification (Gervás et al., 2006)

- **Models of the author**, trying to model the process in which an author creates a story: MINSTREL (Turner, 1993) and MEXICA (Pérez, 1999; Pérez and Sharples, 2001).

- **Models of the story**, using an abstract representation of it, for example, a grammar of the story.

- **World models** - story generation is seen as building a world governed by rules and characters with individual goals. The story develops as a result of how the characters are trying to achieve their goals: Tale-Spin (Meehan, 1977a, 1977b, 1981); Story Generator.
An example of a story generated by MEXICA (1999, 2001)

“Jaguar knight was an inhabitant of the Great Tenochtitlan. Princess was an inhabitant of the Great Tenochtitlan. Jaguar knight was walking when Ehecatl (god of the wind) blew and an old tree collapsed, injuring badly Jaguar knight. Princess went in search of some medical plants and cured Jaguar knight. As a result, Jaguar knight was very grateful to Princess. Jaguar knight rewarded Princess with some cacauatl (cacao beans) and quetzalli (quetzal) feathers.” (Gervás, 2013)
Sub-symbolic NLG

- Deep Neural Networks
  - LSTM – Long Short-Term Memory
  - GRU – Gated Recurrent Units
  - Transformers (Bert, GPT-2, GPT-3, …)
- Training with a corpus of literature
- Generating new texts in the “style” of the learned corpus
The man was an accountant. He had to be. He had to be the next president. I looked back over the top and saw that his wife was crying in the kitchen. I looked at the clock. It seemed to be coming slower, but I knew if I did it would not be long before I was in my own home. I wasn’t sure. I had a hard time finding the right words to say. I was about to leave when he suddenly became angry and began talking to me. “Hello, sir, I’m John. What is your name?” “My name is Manuel and I’m a journalist.” I said

Fan, Lewis, Dauphin, 2018 (Facebook AI Research)
Xie, Rastogi and Chang used MIT’s "Complete Works of William Shakespeare," which contains all of his plays/writings and 154 sonnets and a LSTM Neural Network.
And here’s one written by Deep-speare, an artificial intelligence program that we trained to write sonnets:

JEY HAN LAU, TREVOR COHN, TIMOTHY BALDWIN, ADAM HAMMOND, 2020

Kinky and absurd: The first AI-written play isn't Shakespeare—but it has its moments

Artificial intelligence generates a story about a robot trying to understand humanity

https://www.science.org/content/article/kinky-and-absurd-first-ai-written-play-isn-t-shakespeare-it-has-its-moments
Artificial Intelligence

→ Computation
→ Philosophy
Philosophical ideas behind Symbolic Artificial Intelligence

- Raymundus Lullus (1232-1316)
  Ars Combinatoria, Ars Magna

- Leibniz – Characteristica Universalis (1666)

- Pozitivism
- Logicism
- Formalism
- Structuralism
- Neopozitivism (logical pozitivism)
Philosophical ideas behind Symbolic Artificial Intelligence

- Raymundus Lullus (1232-1316)
  - Ars Combinatoria, Ars Magna
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- Positivism
- Formalism
- Structuralism
- Symbolic AI
- Neopositivism (logical positivism)
Structuralism

- Ferdinand de Saussure
  - Semiotics
  - Meaning → signs differences, signified and signifier
  - Modern linguistics
- Logical positivism
- Claude Lévi-Strauss
- Noam Chomsky – formal grammars
Symbolic Artificial Intelligence – a knowledge-based approach

- Natural Language Processing
  - Grammars
  - Semantic networks
  - Logic

- Several problems, including high computational complexity
Sub-symbolic Artificial Intelligence
Is it also structuralist?

- Deep Learning ➔ Neural Networks

- Deep Learning Natural Language Processing
  ➔ Word Embeddings
  ➔ Wittgenstein
Computer-Generated Literature

- Artificial Intelligence (AI)
- Linguistics
- Literary Theory
- Discourse
- Narratology
- Poetics → effects on the reader
  - life experience
    - time-space (“chronotoposes”)
    - metaphors
    - consciousness
    - dialogs
Problems of AI

- Context, being in the world (Winograd Schemas)
- Lack of empathy
- Lack of creativity
- Lack of consciousness
- Lack of a real dialogue
Winograd schemas – alternative to the AI Turing test

- The trophy doesn't fit in the brown suitcase because it is too big.
- What is too big?

- Jim comforted Kevin because he was so upset.
- Who was upset?
Winograd’s critic

- artificial intelligence cannot go beyond a beaurocracy level, it has no empathy
- a computer, that “as a language machine, manipulates symbols without respect to their interpretation” cannot reach humans, which “create their world through language … always interpreted in a tacitly understood background.” (Winograd, 1987)
Winograd proposal

- a constructivist-hermeneutic approach in the tradition of Heidegger and Habermas
“For Heidegger, language speaks (Sprache spricht). It is not so much that people use words to express their ideas, but that language speaks through us. (…) What took place there happened largely through the power of language, the mechanisms of discourse. Utterances built on each other. Words gathered richness of meaning through repetitive usage.” (Stahl, 2006)
How to overcome AI problems?

- Lack of creativity
- Lack of consciousness
- Lack of a real dialogue

- The existing structuralist approaches do not provide solutions
- Is post-structuralism providing new ideas?
Poststructuralism

- Binary oppositions of structuralism is an immobile approach
- Texts have a particular logic, there is not a hierarchy of meanings, a center (Eagleton, 1983)

- Derrida, Barthes, ...
  - deconstruction
  - differance

- Mikhail Bakhtin (1895-1975) – “a poststructuralist avant la letter”
Bakhtin - a poststructuralist avant la lettre

- A disputed assertion
  - some considers him a Russian formalist, a structuralist
  - Julia Kristeva refers him related to intertextuality
  - considered as the father of **Dialogism** - a socio-cultural paradigm with applications in Computer-Supported Collaborative Learning


- **Virulent critique of de Saussure semiotics** (Voloshinov/Bakhtin, 1928)
Bakhtin’s dialogism

• “… Any true understanding is dialogic in nature” (Voloshinov-Bakhtin, 1973)

• **Opposed to de Saussure ideas:**
  - Real life dialog should be the focus, not written text
  - Words are not arbitrary

• Utterances (not sentences) should be the unit of analysis

• **Speech genres**
  - Polyphony
  - Ventrillogism
  - Inter-animation of voices

• Chronotoposes
Bakhtin’s dialogism

- “word is a two-sided act. It is determined equally by whose word it is and for whom it is meant. As a word, it is precisely the product of the reciprocal relationship between speaker and listener, addressee and addressee” (Voloshinov/Bakhtin)

- Consciousness → Dialog

- It is a dialog among consciousnesses, a polyphony

- Dialogism vs. Hegel dialectics (Markova)
Polyphony and counterpoint

- Concept derived from classical music
  - "These are different voices singing variously on a single theme. This is indeed 'multivoicedness,' exposing the diversity of life and the great complexity of human experience" (Bakhtin, 1984)

- Multiple voices – each utterance contains multiple voices

- Voices inter-animate in an unmerged way:
  - "a plurality of independent and unmerged voices and consciousnesses" (Bakhtin)
Polyphonic analysis

Apple CEO Tim Cook: "I'm not worried about artificial intelligence giving computers the ability to think like humans ... I'm more concerned about people thinking like computers"
Thank you!

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