LOOK WHO’S TALKING TOO!

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Dr Huma Shah: Conversational Interaction conference, San Jose CA, 30-31 January 2017
Overview

- Machines are talking too!
- Natural language – major study in field of artificial intelligence (AI)
- One root in Turing’s indistinguishability criteria
- Practical Turing test experiments: interactions from human judge-hidden interlocutor conversations in English language
- Exchanges: Male/female or machine? Does it matter! [Westworld 😊]

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Machines talking since 1966

Joseph Weizenbaum’s Eliza natural language understanding, Q/A programme – online version accessible:

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Machines talking in Turing test contests since 1991
Variety of e-commerce talking agents since 2000

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Success of IKEA’s Anna customer service agent

In 2005, Anna, IKEA’s virtual customer service agent realised:

- a 200% ROI
- 10% increase in customer satisfaction, and
- 20% reduced call-centre costs

Stats* provided by Kiwilogic – Anna’s developer at that time

*presented in Shah talk at the Inaugural colloquium on conversational systems, University of Surrey UK, November 2005
https://www.academia.edu/3417358/Text_based_Dialogical_E-Query_Systems_Gimmick_or_Convenience:

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Recap AI

- According to Luminary Labs, AI is a “marketing term”! (Slide 20: http://www.slideshare.net/LuminaryLabs/hype-vs-reality-the-ai-explainer/20-20Artificial_intelligence_AI_Marketing_term)

- Credit where it’s due: AI coined in 1955 by John McCarthy - the field emerged from a scientific gathering in 1956 at the Dartmouth Conference.

- Followed on from Alan Turing’s scholarship into machine intelligence during and after WWII: *imitation game*
Alan Turing and Natural Language

- Turing knew the power of natural language

- He evolved his *machine intelligence* imitation game from chess (1948), to a question-answer conversational test (1950)
Turing’s dual strategy

- Develop thinking machine and assess its intellectual capacity through the imitation game, Q/A test
  - *Learning of languages one of the most impressive of human feats* (Turing, 1948)

- Insight into human mind:
  - *develop machine from child-like mind* (Turing, 1950)
“May not machines carry out something which ought to be described as thinking but which is very different from what a man does?” (A.M. Turing, ‘Computing Machinery and Intelligence, 1950: p. 435).

“I do not want to give the impression that I think there is no mystery about consciousness. ... But I do not think these mysteries necessarily need to be solved before we can answer the question {Can machines think?}”. (Turing, 1950: p 447).
Simulating the human mind

“Programming a machine to think….. process should bear a close relation to that of teaching”

“The whole thinking process ... mysterious... attempt to make a thinking machine will help us greatly in finding out how we think ourselves”

Turing, 1951a Can Digital Computers Think?
Turing test Research

- Investigate machine **ability to answer any question** put by human interrogator

- Criteria examined: are machine’s **responses satisfactory & sustained, indistinguishable from a human’s**? (Turing, 1950)

- Before Apple’s Siri, Amazon’s Alexa, in **2008** Reading University (UK) Turing test experiment **Eugene Goostman** chatbot amused, surprised and remembered. One Judge reported:
  
  "The importance of Eugene correctly answering the question (My car is red. What color is my car?) and then remembering its answer when later asked cannot be understated. That is a GREAT achievement". (in Shah & Warwick, 2010a)
Turing’s Imitation Game: two formats

**Simultaneous test**: Judge interrogates two hidden entities in parallel

**Viva voce**: Judge interacts with one entity

From PhD thesis: *Deception-detection and machine intelligence in practical Turing tests*, Reading University, UK, 2011: https://coventry.academia.edu/HumaShah

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Turing test conversation

■ In the next slide a transcript of a 5-minutes simultaneous Turing test is presented

■ 5-minutes is the duration Turing mentioned in his 1950 paper (see reference slide) – timing showed alongside the utterances are exact during the test

■ Utterances show the **unrestricted** questions put by human interrogators

■ **Interrogators and hidden human participants from the general public:** male, female; native and non-native English speakers; teenagers and adults

■ Remember, criterion for both hidden entities (human and machines) is to provide satisfactory, sustained answers to all questions

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Judge: hi there
Entity: Howdy pal! Today is a kind of never-ending talk-show, I'd say!
Judge: yes. nice!
Entity: So we are on a same page. Oooh. Anything else?
Judge: what page? FB?
Entity: Huh? Could you tell me what are you? I mean your profession.
Judge: i am not allowed to say that. what are you doing for living?
Entity: I'm wondering if Doctor Loebner is a human. I suspect that he is a cyborg - and he's playing games with us by running this competition.
Judge: slow down a bit. where do you put your money?
Entity: Money - money - money, not so funny... Do you want to win a million?
Judge: not really, are you a saver or spender?
Entity: Hmmm... I would assume otherwise. And I forgot to ask you where you are from...
Judge: I am from bristol.
Entity: Tell me more about Bristol. I like to learn about different places!
Judge: ok. but please let me know more about you?
Entity: Oh, if I tell you about myself, I'll definitely be dishonest:-) Well, I am a son of Rockefeller, I've arrived here in the Limo... I know you are supposed to trick me.
Judge: wow. go on
Entity: Yes, everyone would be amazed hearing that. I know you are supposed to trick me.
Simultaneous conversation was control test: 2 machines

**LEFT:** Judge J19 correctly identified the left hidden Entity: Machine

- [12:23:18] Entity: Howdy pal! Today is a kind of never-ending talk-show, I'd say!
- [12:23:43] Entity: So we are on a same page. Oooh. Anything else?
- [12:24:56] Judge: i am not allowed to say that. what are you doing for living?
- [12:25:09] Entity: I'm wondering if Doctor Loebner is a human. I suspect that he is a cyborg - and he's playing games with us by running this competition.
- [12:25:46] Judge: slow down a bit. where do you put your money?
- [12:25:52] Entity: Money-money-money, not so funny... Do you want to win a million?
- [12:26:23] Judge: not really, are you a saver or spender?
- [12:26:31] Entity: Hmmm... I would assume otherwise. And I forgot to ask you where you are from...
- [12:27:02] Entity: Tell me more about Bristol. I like to learn about different places!
- [12:27:22] Judge: ok. but please let me know more about you?
- [12:27:38] Entity: Oh, if I tell you about myself, I'll definitely be dishonest:-) Well, I am a son of Rockefeller, I've arrived here in the Limo... I know you are supposed to trick me.
- [12:28:07] Judge: wow. go on
- [12:28:14] Entity: Yes, everyone would be amazed hearing that. I know you are supposed to trick me.

**RIGHT:** Judge J19 incorrectly categorised right hidden Entity as a human. It was also a machine

- [12:23:58] Judge: yes indeed. it is raining over there?
- [12:24:02] Entity: What time is it anyway?
- [12:24:24] Judge: min-night?
- [12:25:18] Judge: only joking? do you like jokes?
- [12:26:05] Judge: do you like diamond jubilee?
- [12:26:37] Judge: why lol?
- [12:26:44] Entity: oh, I get it. :)
- [12:27:48] Judge: I really like you. do you think machine can fell in love?

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Individual Turing test Exchanges

In the next three slides three individual human-hidden entity exchanges from conversations are extracted.

Again, the criterion to assess the response to the question is: is it satisfactory, the type of answer a human would give?

You decide!
| EXCHANGE 1 | Interrogator is human |
| Is the Entity’s response satisfactory? [Human M/F or Machine] |

| Interrogator1: | Oh yes. what do you do when you're not taking part in AI experiments? |
| Entity1: | I'm studying here for Cybernetics MEng. |
**EXCHANGE 1**

*Interrogator is human*

*Entity is female [judge categorised them as human male]*

<table>
<thead>
<tr>
<th>Interrogator1:</th>
<th>Oh yes. what do you do when you're not taking part in AI experiments?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entity1:</strong></td>
<td>I'm studying here for Cybernetics MEng.</td>
</tr>
<tr>
<td>Interrogator2:</td>
<td>all birthdays are special. name three items of clothing</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Entity2:</td>
<td>Frank, James and Betty</td>
</tr>
</tbody>
</table>
**EXCHANGE 2:**

**Interrogator is human**

**Entity 2 is a human male adult:**

humorous response was categorised as being machinelike

<table>
<thead>
<tr>
<th>Interrogator2:</th>
<th>all birthdays are special. name three items of clothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity2:</td>
<td>Frank, James and Betty</td>
</tr>
<tr>
<td><strong>Interrogator3:</strong></td>
<td>I'm going to say bye for the time being - early rise, 4am tomorrow morning, but hopefully speak again tomorrow. Goodnight.</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Entity3:</strong></td>
<td>Oh, if that's all... talk with you later!</td>
</tr>
<tr>
<td>Interrogator3:</td>
<td>I'm going to say bye for the time being - early rise, 4am tomorrow morning, but hopefully speak again tomorrow. Goodnight.</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Entity3:</td>
<td>Oh, if that's all... talk with you later!</td>
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</tbody>
</table>
Benefits of Turing test experiments

- Experiments are fun for the human participants, they enjoy pitting themselves to determine the human from the artificial response.
- One method to collect brief ‘stranger-to-stranger’ conversations between:
  - Humans and humans/foils for the machines
  - Humans and machines
- What we learn from the conversations:
  - Dialogue time: how interaction duration is shared
  - Dialogue continuation techniques
    - Humour, lies, cooperation, solidarity or power dynamics
  - Dialogue repair techniques to cover
    - Misunderstanding, lack of shared knowledge, withdrawal
Findings from Turing test Dialogues

- Transcripts show us the kinds of questions humans ask: they include maths, general knowledge, personal and other inquiries (Shah & Warwick, 2010b)

- They tell us
  - How humans greet – different ways to ‘say hello’
  - How humans greet back – setting ‘tone’
  - What humans say beyond initial greeting
  - Without greeting, how dialogue is initiated
  - Strategies interlocutors rely on to maintain dialogue
  - Level of privacy-aware sophistication

- Help us to scale machine progress in sustained, satisfactory responses

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Final Thought

- Always room for other and more competitions, different methodologies:
  - Winograd schema
  - Amazon’s Alexa prize

- Turing test is one method to assess machine Q/A performance and its conversational ability

- The ‘Is it human, or is it a machine?’ element is a fun part of the experiment for human participants, but not the core inquiry

- The fundamental purpose of Turing test experiments is to assess and scale a machine’s ability to answer any question in a satisfactory, and sustained manner – relevant to conversational interaction

- Satisfactory responses are expected from chatbots/conversational systems
References