The Gears are Turing

New Mexico

Supercomputing Challenge

Final Report

April 5th, 2017

JacksonMid-1

nex+Gen Academy, Hoover Middle School, Jackson Middle School

Team Members:

Isabella Montoya, Munia Omer, Reyanna Fromme, and Savannah Phelps

Sponsor Teacher:

Karen Glennon

Mentor:

Neil Haagensen

Executive Summary:

Finding a problem that both challenged and interested the team posed a problem in itself, but after a sufficient amount of digging, the team learned about the idea of the Turing Test. They were interested in creating an AI themselves. An AI, or artificial intelligence, comes in many different forms, and one of those forms is conversational machinery[8]. Alan Turing described an AI as a machine that could deceive a human rather than the more modern definition of a machine that could learn information autonomously[2].

The methods of modeling the problem showed to be another roadblock. The team's intent was to produce a computational AI that could interpret user input and find an appropriate response. They began to hit the books to develop a extensive of knowledge of the Turing Test, and how to pass it[1].

Around this time the members of the team traveled to the New Mexico Institute of Mining and Technology for the kickoff to share their plans with knowledgeable scientists, which resulted in the growth of the project. The team’s research was initially aimed at developing an AI of sorts that could successfully be tested without fail by the Turing Test, but after consultation, they decided to narrow the wide spectrum to simply creating a conversational machine that could theoretically deceive a human, as the process of testing the machine and bringing it to such a high standard would not be feasible.

Not long after this, the team gained its final member, Savannah Phelps, who became a great asset to the project at large.

The team has decided to model it after a quintessential teeneger, as teenage mannerisms could be used as a diversion tactic to aid the machine’s powers of deception[12].

Their research included some patterns used by past AIs as well as how best to go about designing the program in terms of code structure, processing of responses, and to computationally mislead an audience[3].

The team used the coding language Python to assemble the conversational machine, and will be implementing strategies and tools such as parsing, tagging, and using the NLTK (Natural Language Toolkit)[11].

The team had a successful endeavor creating this machine, and enjoyed every meeting.

Introduction:

Problem:

The team's problem this year is, *can we successfully create a conversational machine that can imitate a human teenager?*

What is Being Modeled:

The team is modeling a conversational machine simulating a quintessential teenager. This teenager, following popular belief, will have had poor grammar, sentences that may not make sense, slang, abbreviations, and interests similar to those of teenagers in the current time. In, this the team aims to use these stereotypes to help drive the perception of authenticity of the machine to older audiences, who are perhaps unfamiliar with teenage jargon[12].

What is Included in the Model:

Included in this model will be a Python code creating an AI of sorts, which will be showed in the form of a text conversation with a teenager. The team will strive to put the code online[6] for use of the judges and to further deceive the user[1]. In , the code the team included a procedure used to tag words based on the parts of speech. To form sentence based on the user input.

Excluded in the Model:

The team did not provide a functionality for an advanced AI[1], used in such technologies as Siri or Amazon Echo which can develop knowledge or "learn as it goes"[3]. The machine may be upgraded later to do such a thing, but as of this year, the team is primarily focused on receiving a valid response from the program. Hopefully, producing a model that can deceive a human.

Why are you Creating the Model:

The team chose to create this machine because of their interest in Alan Turing's concept of replicating human intelligence in an AI, and deceiving humans of its false authenticity[3]. The team was intrigued by this thought, and considered the possibility with creating such and AI, and, when finding it plausible, proceeded[2].

Objectives Throughout the Project:

- **Research**
    - The team investigated speech and text mannerisms used by teenagers, and the psychology behind these quintessential responses[12]
    - Reviewing methods other successful machines have used to deceive people[8]

- **Program**
    - Learn the basics of Python[5]
    - Receive a preliminary response from the machine, although scripted
    - Download and master NLTK (Natural Language Toolkit)[11]
        - This will aid the team in tagging user queries and producing an understandable response
    - Implement Parsing
        - This involves tagging specific words by part of speech and searching them in an array provided by NLTK

- **Incorporate Learned Research**
    - Teenage Mannerisms [12]
        - This includes abbreviations, slang, and preferances of teenagers (see *Teen Mannerisms* section of research for further info)
    - Strategies For Deception

Developing a strategy for the initial facade the machine will act as

Method:

Start of the year:

When, starting at the beginning of the year the team consisted of two members Reyanna Fromme and Isabella Montoya. As the year progressed, the team did as well. Gaining two members Munia Omer and Savannah Phelps. The team was diversified through three different school across albuquerque and even separated across grade levels. This led the team to having varied ideas on how the project should be executed.

Kickoff Feedback:

After kickoff, the team returned ready to continue the project. At kickoff the team received valuable advice that helped shed light on their initial plan. They were advised that creating a full turing test would too tenacious. The team was redirected in a reduced path, simply creating an AI that could **theoretically** deceive a human[3]. When, receiving this feedback it helped narrow the team to one central goal.

Research:

- Other AIs:

When it came to the research portion of the project the team went to reviewing other deceptive conversational machines to help develop a strategy for decrypting the problem.

In this the team reviewed machines such as PARRY which used a method of deception where he was portrayed as a schizophrenic patient and would often drone on long monologues. Which allowed the machine to be less reliant on user input alone. Another, machine the team studied was coined ELIZA who relied on user inputs to format responses, similar to how a therapist asks his or her patients. By reviewing these machines the team was able to incorporate their strategies into the final product[13].

The team considered one other AI, but for a different purpose. Cleverbot, a popular web-based AI stores data received from user inputs in a large array. Using the data the AI draft a response based on the popularity of the phrase. The team will implement a similar function and essentially become smarter the more it is interacted with[7].

See Bibliography for citations and further information.

- Teenage Mannerisms

Through research, studying the psychology of teenagers and their speech patterns, the team has found a sufficient amount of data to grasp the general speech patterns of teenagers. As you can observe from *Fig. 1*, teenage participants in a study conducted were reported to have used more abbreviations, emoticons, “text talk” (referring to missing a key on the virtual keyboard; typing “shoul” instead of “should”), and informal words such as “homie” or “fam”.

See Bibliography for citations and further information.

Informal language	Nurse (n=72) n (%)	Participant (n=78) n (%)
Contraction	52 (72)	27 (35)
Abbreviation	14 (19)	19 (24)
Emoticons	0 (0)	10 (13)
Text talk	2 (3)	13 (17)
Multiple punctuations	4 (6)	0 (0)
Informal words	0 (0)	9 (11)

Fig. 1

- Alan Turing and the Turing Test

In 1950, Alan Turing wrote a report on the concept of AIs and a fundamental question asked in his time, “Can machines think?”. This was forward thinking to rival that of Da Vinci, as digital computers were barely off the ground and nowhere near the capabilities of creating an AI.

Turing discussed not only how AIs could be structured, but how they could be tested (the Turing Test), how digital computers should be designed, whether or not an AI can think in the truest sense of the word, and articulated common misconceptions and fears about the future of digital computers[2].

The Turing Test, one of the many aspects Turing elaborated on, is a test performed on AIs to determine if they can genuinely deceive a human. Turing proposed it to answer the question mentioned earlier. He wondered if in a game where a judge had to determine which of his or her unseen associates was a male or female, one associate could be replaced with an AI

and the guesses made by the judge would remain in a similar pattern (not becoming overall right or wrong because of the replacement)[10].

Long after Turing's death, the Turing Test was coined and made into a national competition, and many AIs now receive the Turing Test to determine their quality[4].

See Bibliography for citations and further information.

Deception Strategy:

After studying AIs from previous years such as winners in the Association for Computing Machinery's Turing Award (see *Other AIs* section in research for further info).

Each of the AIs did not win the award in a fashion you would call "normal". Each had a method of deception, so to enhance the realism of the machine, we have decided on a pseudo personality for our program[2].

The team will program our machine to replicate a quintessential teenager. We will do this by incorporating poor grammar, slang, abbreviations, and other teenage mannerisms into the responses of our program[12].

Conceptual Models:

<u>Pre-NLTK:</u>

Below, is the team's initial conceptual diagram. It was first drafted to make an outline named the "Skeleton" program which helped map the earlier stages of the future Python program. It dealt mainly with if then procedures and simple parsing scripts. This conceptual diagram was later modified to incorporate the NLTK (Natural Language Toolkit)[11] and more advanced levels of parsing.

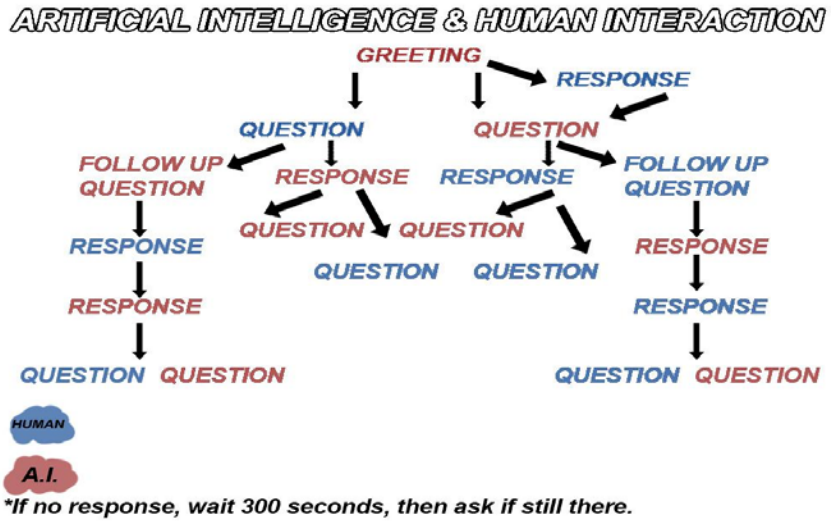


Fig. 2

Post-NLTK:

After, the team was shown the Natural Language Toolkit[11] by Nick Bennett the team was able to start constructing more complex forms of code. Using the different types of arrays the team was able to make the processing of sentences even easier. This explained in Fig. 4 and 5.

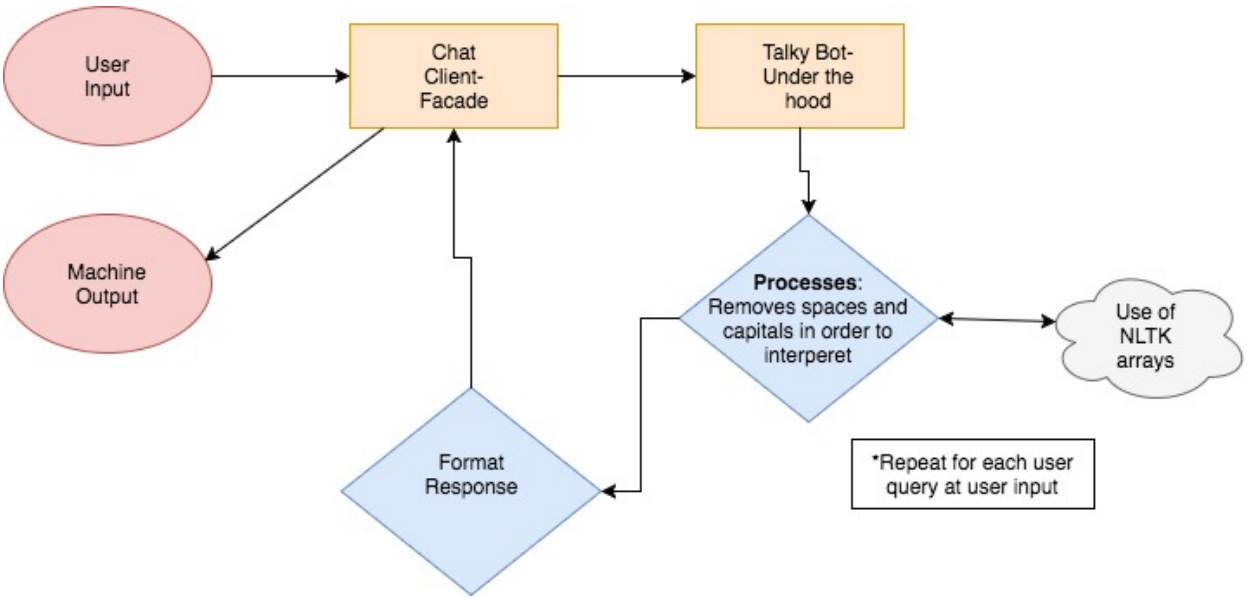


Fig. 3

Current Progress:

- Completed extensive research on teen mannerisms, the Turing Test, and other successful AIs (see research section)
- Began preliminary code on a web-based Python[5] compiler and experimented with rudimentary parsing
- Discovered NLTK (Natural Language Toolkit)[11] via mentors, which will assist in tagging parts of speech
- Successfully opened a different Python compiler and added NLTK
- Planned future progress and discussed options for code

Struggles:

- Difficulty meeting and making progress because of diversity in schools and grades
- Slow progress perfecting the Python program and making progress
- Inability to contact psychologists even through frequent prompting and difficulty locating valid and accessible articles discussing our subject

Results (Pending):

At this point in the project the team’s solution to the problem is still unclear. The team is continuing develop the code to determine conclusive results, but the expectation is that a functioning conversational machine will be procured. The team plans to complete the program and present the final results at the Expo in Albuquerque .

Conclusion (Pending):

The conclusion of this project is still pending, based on the results of the program. The team will present the conclusion and finished product at the Expo in Albuquerque. This project has been filled with many dead ends. Through each struggle the team has preserved and is looking forward to showing the judges the final product.

Graphs and Diagrams:

Fig. 4

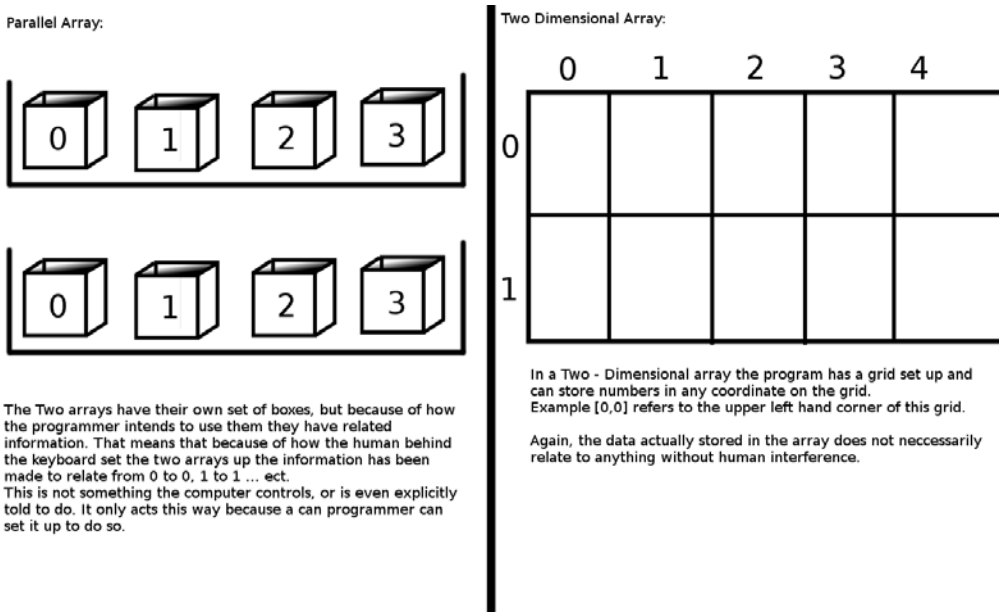
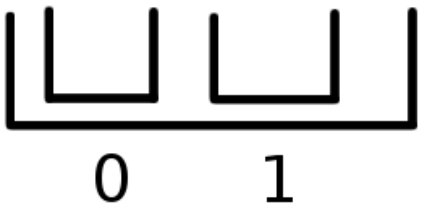


Fig. 5



As it turns out the Natural Language ToolKit (nltk) will create a little 1-dimensional array (that it calls a 'tuple') if given a Word + Part Of Speech tag pair.

It should break apart the String into the Word and Part of Speech.

More research and study is required to verify this and to take advantage of this feature.

Acknowledgements:

The team would like to fervently thank Karen Glennon and Patty Meyer, our kind sponsor and our constant aid. They would also like to thank Neil Haagensen, our wonderful Python mentor, and Nick Bennett, our ingenuitive idea man.

Bibliography:

[1] The Turing Test: Can a Computer Pass for a Human? - Alex Gendler. Dir. Ted X. Perf. Alex Gendler. TED-ed. N.p., 25 Apr. 2016. Web

[2] Vampola, David. "The TuAI and Python: Developing a Conversational Interface ... - SlideShare." 26 Jul. 2009, Turing Test." The Turing Test. N.p., n.d. Web. 03 Oct. 2016.

[3] Harnad, Stevan. "The Turing Test Is Not A Trick: Turing Indistinguishability Is A Scientific Criterion." University of Toronto: Department of Psychology. N.p., n.d. Web.

[4] Turing, By A. M. "Computing Machinery and Intelligence A.M. Turing." Computing Machinery and Intelligence A.M. Turing. N.p., n.d. Web. 03 Oct. 2016

[5] Python tutorial - Tutorialspoint." https://www.tutorialspoint.com/python/. Accessed 5 Jan. 2017.

[6] Felix, Jerry. "AI and Python: Developing a Conversational Interface Using Python." SlideShare. Jerry Felix, 26 July 2009. Web. 4 Apr. 2017.

[7] Great chatbot building - the ultimate cheat sheet - Recast.AI Blog." 6 Oct. 2016, https://blog.recast.ai/great-chatbot-building/. Accessed 5 Jan. 2017.

[8] Reingold, Eyal, and Johnathan Nightengale. "The Turing Test." PSY371 Artificial Intelligence Tutorial Review. Eyal Reingold, 1999. Web. 4 Apr. 2017.

[9] Reingold, Eyal, and Johnathan Nightengale. "The Turing Test Is Not a Trick." PSY371 Artificial Intelligence Tutorial Review. Eyal Reingold, 1999. Web. 4 Apr. 2017.

[10] Turing, Alan. "Computing Machinery and Intelligence." Loebner Prize. N.p., 1950. Web. 4 Apr. 2017.

[11] "Natural Language Toolkit." Natural Language Toolkit — NLTK 3.0 documentation. N.p., 2 Jan. 2017. Web. 04 Apr. 2017.

[12] "Texting teens in transition: the use of text messages in clinical ... - NCBI." https://www.ncbi.nlm.nih.gov/pubmed/25379624. Accessed 5 Jan. 2017.

[13] "Alan Turing Scrapbook - Turing Test." http://www.turing.org.uk/scrapbook/test.html. Accessed 5 Jan. 2017.