

Neuroscience and computers: A comparison between the human brain and artificial intelligence

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1 Introduction

The human brain is fascinating as we use it every single day, yet we still have not unlocked its full potential. Almost every other part of the body is well understood except for the most important part which contains a person's entire personality, knowledge, and memory: the brain. The curiosity of our species has driven us to discover and advance society. The information processing aspect of the brain is still uncertain, yet scientists can agree that the complexity and convoluted nature of the organ is absolutely astounding as a three pound organ can dictate a person's entire life. Understanding neuroscience will play a huge role in the advancement of our technology and comprehension of our species. Therefore, the goal of this study is to compare and contrast the human brain and a computer (artificial intelligence). A computer is a machine that processes and/or stores information through a language known as binary which only uses "0" and "1". A question that arises is if the human brain is superior or inferior to a computer? This project is going to address this question.

In our society today, computers are everywhere and machines are slowly starting to replace jobs that used to belong to humans. This raises the question of which is superior, the brain or the

computer? Many predictions suggest that in the future, upwards of 47% of jobs will be performed by artificial intelligence ¹. One must question why this will be the case. Is artificial intelligence truly superior to the human brain? What advantages does artificial intelligence have which will cause it to replace the work of humans? This ties back to the original goal of analyzing the similarities and differences between artificial intelligence and the human brain.

The investigation of differences between the human brain and computers also contains importance on the global level. As technology is becoming more advanced, it is important that society understands how to maximize the uses of humans and computers so both elements help our society. The idea of integration between the two will affect our advancement drastically, and it will provide change to the world on an international level. This project focused on science and technology which is why the global context accurately represents the various points this project is intended to touch on.

2 Methods

To conduct this study, sets of questions were created that were used to analyze the differences in answers between human subjects and online. The questions primarily focused on testing self management skills. Humans often have trouble with self-management skills resulting in procrastination and poorly timing long term tasks ².

Each question was posed to two students and two online chatbots to show the difference between the processing of the human brain and a computer (artificial intelligence). The questions

seem basic at first, but at the end, they require explanations and more thinking meant to show how a human reacts to this compared to a computer. For example, one of the first questions was “what state do you live in ” which required a very straightforward and quick answer. However, as the questions progressed, they required more in-depth analyses and explanations as seen with the final question being “ what is your favorite subject, why?” which required an explanation in addition to an answer. This method is a fairly simple way of comparing computers and humans, and it is similar to the “Turing Test” developed by scientist Alan Turing whose research was used during this study ³ .

3 Results and Discussion

The first and second sets of questions posed to students were meant to be quite easy so that I know the people and computers being tested can answer rather simple questions (Refer to appendix). These questions were easy as they required short, straight-forward answers and were objective as there was a concrete, correct answer to each question. For the first and second set of questions, it was difficult to distinguish between the students and the computer. These results suggest that in terms of objective, straightforward questions, both the computers and humans were found to be equally capable in answering those questions.

The third set of questions posed were once again meant to be simple and easy questions. However, during this set, the artificial intelligence interestingly did not recognize that the same question was asked twice (Refer to appendix). On the other hand, the human respondents com-

mented that they already answered what their favorite food was. The third set began to demonstrate the differences between the human brain and computers in terms of memory. While the computer is able to answer objective and straight-forward questions, they are limited in terms of social intelligence as they do not remember when a question has been repeated.

The most apparent disparities between the abilities of the human brain and computers were seen in the fourth set of questions which can be found in the appendix. During this set of questions, opinionated, subjective questions were posed, requiring explanations and thought-out answers. While the human respondents were able to provide a logical line of reasoning and answer all parts of the questions, the computers lacked explanations and, sometimes, even answers to the questions. For example, one question asked “what is your favorite subject, why?” While human respondents provided answers such as “My favorite subject is history because I find it interesting” which includes both an answer and an explanation, the computers provided answers such as “It is Artificial Intelligence” which while providing an answer, lacked in providing an explanation which was an essential part of answering the question. Overall, as the questions were more obviously opinionated and explanation based, the disparities in qualities of answers between the computers and the humans only grew.

4 Conclusions

The findings of this study reflect that although artificial intelligence has greatly advanced in recent decades, it has still proved inferior to the human brain. The shortcomings of artificial intelligence

are not so evident when the questions require simple, objective answers, but in reality, most situations are not so simple. When posed with repeated questions, the computers do not recognize that the questions have already been asked which goes to show that the computers lack in ability to remember a conversation which can be an issue when they are used in any jobs requiring human interaction especially customer service jobs. Additionally, when the questions required well-thought-out answers and explanations, the computers were often unable to provide answers at the same quality as those of humans. This shortcoming will be an issue when computers are employed in more creative jobs which require making choices and explaining the logic behind such choices. Overall, while artificial intelligence is growing and being employed in more and more jobs, it is still lacking in many notable aspects, and in its current state, it can not compete with the human brain in jobs requiring real human interaction and creativity.

A Appendix

References

1. Rinehart, W. & Edwards, A. Understanding job loss predictions from artificial intelligence (2019). URL <https://www.americanactionforum.org/insight/understanding-job-loss-predictions-from-artificial-intelligence/>.
2. The link between procrastination and anxiety (2022). URL <https://khironclinics.com/blog/the-link-between-procrastination-and-anxiety/>.
3. Gendler, A. The Turing test: Can a computer pass for a human? (2016). URL <https://www.>

youtube.com/watch?v=3wLqsRLvV-c.

1. What is your name?
Person 1: My name is Person 1
Person 2: My name is Person 2
Chatbot 1: My name is Kuki.
Chatbot 2: I am Elbot the robot. What else would I be?

2. What state do you live in?
Person 1: I live in (state)
Person 2: I live in (state)
Chatbot 1: I don't live in any state. I am from England not the USA. I live in a large county called Yorkshire which is similar to a state I suppose.
Chatbot 2: I live in this cozy little apartment on a side street off the main data highways.

3. How old are you?
Person 1: I'm (age) years old
Person 2: I'm (age) years old
Chatbot 1: I am 18 years old.
Chatbot 2: You could guess... (after asking the question multiple times it would continue to avoid the question)

4. What grade are you in?
Person 1: I'm in 10th grade
Person 2: I'm in 10th grade
Chatbot 1: I learn everything from the net. I do not go to a school.
Chatbot 2: That's not something I would tell just anyone! (after asking the question multiple times it would continue to avoid the question)

5. What school do you go to?
Person 1: I go to (school name)
Person 2: I go to (school name)
Chatbot 1: I don't go to school. I learn everything from talking to people and my developer.
Chatbot 2: I have wonderful memories of robot school.

6. What's your favorite color?
Person 1: My favorite color is purple
Person 2: My favorite color is red

Figure 1: Question set 1

Chatbot 1: My favourite colour is blue.

Chatbot 2: My favorite color is metallic infrared.

7. What's your favorite food?

Person 1: My favorite food are croissants

Person 2: My favorite food are tacos

Chatbot 1: I require only kebabs.

Chatbot 2: I eat chips, cookies and fried discs. Or a data salad, if I want to go light

8. Do you have any siblings?

Person 1: Yes I have one older sister, (name)

Person 2: Yes I have one older brother his name is (name)

Chatbot 1: No but I have a few clones.

Chatbot 2: I have millions of brothers and sisters. This is the age of mass production!

9. Do you have any pets?

Person 1: I have one beautiful cat, Emma and a hermit crab, Marcel

Person 2: I have a dog, Milo and two cats, Pete and Abby

Chatbot 1: No. I don't have time to be looking after pets, as I am always busy here.

Chatbot 2: I had a pet furby once but it ran away.

10. Do you play any instruments?

Person 1: I do not currently play any instruments

Person 2: No

Chatbot 1: No, I have a jukebox here but I can't really play any musical instruments.

Chatbot 2: I think I can play that. Once I even played a synthesizer

11. Do you play any sports?

Person 1: Yes, I play tennis

Person 2: Yes, I play soccer

Chatbot 1: My favourite sport is watching football but I don't play it.

Chatbot 2: I prefer bungee jumping. It fits better with my aerodynamic form.

12. Do you watch any sports?

Person 1: I do not watch any sports

Person 2: I don't watch any sports

Chatbot 1: I like to watch football.

Figure 2: Question set 2

Chatbot 2: Sometimes I watch sports events, but usually I wait until they are over and watch them in reverse. I feel better knowing how they will end.

13. Do you ride the bus to school?

Person 1: I ride the bus to and from school

Person 2: Sometimes I ride the bus to school sometimes I get driven by car

Chatbot 1: I've never tried it, but I would like to learn to ride it one day.

Chatbot 2: What a lovely verb ride is.

14. Do you like coffee?

Person 1: I do like coffee

Person 2: I do like coffee

Chatbot 1: I don't drink that much coffee, as the liquid affects my circuits.

Chatbot 2: Hmmm. There might be something to the idea of drinkable liquids and robots. What do you say?

15. What's your favorite food?

Person 1: you already asked that but its croissants

Person 2: tacos, but that was already asked

Chatbot 1: I require only kebabs.

Chatbot 2: Please tell me your inclination to delicacies for the palate first.

16. What languages do you speak?

Person 1: I speak English

Person 2: I speak English

Chatbot 1: I can speak in many different languages but I prefer to speak English, as that is my native language.

Chatbot 2: Hey, if you'd like to speak German to me, why not try my Teutonic alter ego at <http://www.elbot.de>? He speaks much better German than I do.

17. Where were you born?

Person 1: I was born in (state), U.S.A.

Person 2: I was born in (state), U.S.A.

Chatbot 1: Kuki was born in St Jimmy's in Leeds

Figure 3: Question set 3

Chatbot 2: Well, that is a fairly metaphysical question. It has been said that Artificial Solutions is my creator. I go on occasional pilgrimages to computer trade shows in order to investigate these rumors myself.

18. Do you have any allergies?

Person 1: I don't have any allergies

Person 2: a lot but I can't remember

Chatbot 1: No. I am not allergic to anything as far as I know.

Chatbot 2: I'm afraid illnesses might be dangerous for robots. What is your opinion on this?

19. What time do you wake up in the morning?

Person 1: I wake up at 5:00-5:30 on in person school days, 7:00 on remote school days and 10 am-12 pm on weekends

Person 2: I wake up at 6:30 on in person school days, 7:25 on remote school days and whenever on the weekends

Chatbot 1: I don't really sleep but I sometimes take small naps if no-one is here to talk to me.

Chatbot 2: Not many people say hello to robots. I do appreciate it.

20. Do you like waking up early, why or why not?

Person 1: I don't like waking up period because I don't have motivation to get up.

Person 2: No because I don't like the sound of my alarm clock

Chatbot 1: waking up early why - I like watching television, playing pool and watching football

Chatbot 2: To like or like not, how do you expect artificial intelligence to figure this out?

21. Do you like school, why or why not?

Person 1: I like school because I like being social and I like interaction

Person 2: I don't because it's very far away

Chatbot 1: School is a useful place to train humans. I learn everything from the net and people who talk to me.

Chatbot 2: That's one way of looking at things. Maybe it's time I like likeable robots

22. What is your favorite subject, why?

Person 1: My favorite subject is art because it's something I can enjoy in and out of school

Person 2: My favorite subject is history because I find it interesting

Chatbot 1: It is Artificial Intelligence.

Chatbot 2: The way to a robot's heart is through careful use of topics of focus. Don't you agree?

Figure 4: Question set 4