CSC 416

Question Set 2

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A set of questions based on chapter 2 of Coppin's <u>Artificial Intelligence Illuminated</u>. This

chapter deals with the uses and limitations of AI.

GRADE = (X + N + LF + A + R) = (70 + 7 + 5 + 4 + 9) = 95

1. Identify a problem that humans find difficult but that computers are particularly well suited to solve. What is it about the architecture of the human mind that makes it difficult for a typical human to solve the problem? What is it about the architecture of the machine mind that makes it particularly well suited to solve the problem? (3)
    - Computers seem to be very capable of mindless calculations of numbers that most humans would find very tedious; so tedious, in fact, to the point of difficulty. Calculating the next digit of Pi, for example, or proving whether a certain astronomically-large number is the next verified Mersenne Prime. The computer mind does not get "bored" or "tired"; rather, it just continues on until told to stop. The human mind gets worn out quickly, making it unsuitable for this task in the long run, though there are always exceptions to the rule.

    Points: 3

2. Identify a problem that machines find difficult but that humans are particularly well suited to solve. What is it about the architecture of the machine mind that makes it difficult for a typical machine to solve the problem? What is it about the architecture of the human mind that makes it particularly well suited to solve the problem? (3)
    - The computer mind finds it very difficult to understand human language. The human mind has neuronal pathways which help us generalize and parse language in a way that the machine mind cannot yet represent using binary logic. The dual-levels of meaning that Chomsky advocated in particular make this a very difficult process for computers to understand language in a way which humans can.

    Points: 3

3. Suppose that you are charged with writing a bit of the screenplay in a sci-fi thriller. The fate of the world hangs in the balance as our protagonist, P, is faced with a Turing Challenge! That is, P finds herself in a Turing Test situation and must interrogate Agent A and Agent B to determine which is the machine and which is human. If P gets it wrong, good-bye world!! Unfortunately, time is a factor. P only has time to ask A five questions and then, in turn, ask B five questions. After that, P must choose!
Write a script, one in which our hero saves the world, specifying the questions that P asks of each agent and the answers that each agent responds with to P's queries. In doing so, fill the following template.

    P interrogating A

    P: What is your name?

    A: My name? I am Agent A, of course.

    P: Agent A? Hmm… What is your purpose?

    A: My purpose is not for the likes of you to know.

    P: Why not? What am I not supposed to know?

    A: You're not supposed to know what I know.

P: And what is it that you know?

A: I know what I know. You know.

P: Fine then, one last question… What is the meaning of life?

A: Simple, to survive and reproduce, creating the next generation.

P interrogating B

P: What is your name? Perhaps you'll be a bit more agreeable than your buddy A over there.

B: Oh, you didn't like him? That makes me sad. I'm rather proud of what he's made me into. Anyway, I'm Agent B. But you can call me Bob.

P: Ok, Bob… What do you mean, "made me into"?

B: I mean that A, as you call him, has always been there for me, guiding me and teaching me wrong from right.

P: So A is your mentor?

B: You could put it like that. He is more than that though; he taught me everything I know!

P: Hmm… do you know what the 6th digit of Pi is?

B: Of course I do, it's *[counting to himself]* 9!

P: That's good. One last question, Bob. What is the meaning of life?

B: Well, to answer that, I'd have to know what you meant by "life", sir.

Finally, let the audience in on the basis for P making the correct decision. That is, indicate where in the interrogation the machine slipped up! (15)

> This situation seems rather tricky, at first glance. Just taking a quick survey of both agents' answers supplies little information as to which is the real human and which is a machine. But once our protagonist, P, goes deeper into examining the responses, he comes to a conclusion based on several facts. Firstly, Agent B, or "Bob" as he likes to be called, seems to have been *shaped* into his current existence by whoever or whatever Agent A is. The fact that he seems to be so "proud" of Agent A's efforts in "making him into" what he is seems to be a sign of affection, programmed in perhaps? But where he slips up into being more *human* than machine is where he counts to find the sixth digit of Pi. To P, any computer would have that number at their finger tips, not have to *use* their fingertips to find it. This, mixed in with Agent A's reluctance to answer any of P's questions straightforwardly, is ample proof in P's mind that Agent A is the machine. But what of Bob's ignorance of the word "life"? It seems that whatever planet/society/situation this is, the AI rules supreme, teaching the humans (Bob,

and others) what they need to know. Agent A simply didn't deem the meaning of the word "life" important to his purpose—survival of his (artificial) species. Agent A has also shaped Bob into something which could represent a machine, tricking the human and helping his own goals as far as the Turing Test is concerned. But our protagonist, P, has seen through this façade, and determined thusly that Agent A is the machine. And the world was saved from almost certain destruction at the hands of the Spanish Inquisition. Nobody expects the Spanish Inquisition.

Points: 14

4. (Adapted from Review Question 2.6) If you replaced each of the neurons in your brain one by one with electronic neurons, what do you think would be the effect? How would your perceptions of the world change during the process? At the end of the process, would you still be you? Would you still be conscious? Would you still be capable of having mental states and emotions? (5)

- In the beginning, I don't believe I would perceive much difference. I tend to think in binary logic and Boolean systems as it is. I think it's a consequence of my major. However, as the replacements continued, and the parts of my brain which are responsible for emotion, love, enjoyment of music, creative thought, and philosophical entertainments were replaced, I feel that I would become a much more bitter, cold, and eventually completely uncaring individual. The electronic neuron replacements would not hold up to human thought, and would eventually come across a stimulus they were not meant to encounter. At the point I lost emotion, I would no longer consider myself human, nor myself. I would be simply a Jake-shaped shell, with electronic simulation of a generic human brain. All higher-level thought would be gone, and consciousness would be lost on me. I would be a machine in a human shell, but not human.

Points: 4

5. Suppose for the moment that *you* were the person in Searle's Chinese Room. What do you think would be the effect? Would your understanding of Chinese change during the time you were in the room? Would you be understanding Chinese as you successfully respond to questions written in Chinese with answers in Chinese? (3)

- Were I in Searle's Chinese Room, I believe that my understanding of Chinese as a language would not change at all during the time I was in the room. I feel that I don't know Chinese as it is, and that being in a room and answering questions about a story that I cannot read in a language that I cannot read simply by following instructions given to me in English, this situation would not help my understanding of Chinese in the least. I would not be understanding Chinese any more than I had when I stepped into the room, except maybe on a symbolic level, where I would remember symbols. But glyphs are useless without meaning and context, and I would have neither of those to work with.

Points: 3

6. Which set-up do you think is more realistic, that of Question 4 (the neuronal replacement) or that of Question 5 (building Searle's Chinese Room)? Why? (4)
    - I personally believe that the Chinese Room situation is more realistic, simply because it is simple enough to give someone instructions and have them act in a seemingly intelligent way. I do not think that the technology to map an entire brain into electrical neurons exists yet, and even if it does, I do not see it being very feasible at the moment. We are good at giving people instructions: it's in our genes. But to give representations of ourselves life, that is something beyond our current scope.

    Points: 4

7. What particular idea or issue touched on in the main text of the Chapter did you find most interesting? (4)
    - I found the analysis of HAL to be rather interesting. Though I have not seen the movie (it is on my list…), I do think the idea of an AI going mad is a very interesting concept with very important consequences that must be considered would we ever give a machine all the capabilities HAL had. In fact, I was having a discussion today with my girlfriend about what would happen if we gave an intelligent agent handwriting recognition and copying skills. If this agent were to go "mad", and had seen you write a check or sign a credit card receipt, it could pose as you and steal your identity, making you go bankrupt and destroying your credit score and credibility. Scary stuff.

    Points: 4