


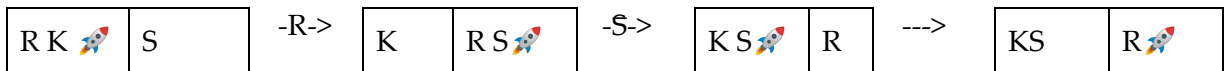
CS 7637 Homework 1:

Abhijeet Gaurav
agaurav@gatech.edu








Question 1:










In my Semantic network, I represent Rey with R, Snoke with S, Kylo with K, Shuttle with . I represent each of the node/state in the form of a box with left side representing things in Quesh and right side representing things in Ship. Transformation with label ---> between the nodes represents shuttle being moved between Quesh and Ship. Label -X-> represents shuttle carry X from Quesh to Ship and -X-> represents shuttle carry X back from Ship to Quesh where X can either be R, K or S depending on the person being carried by the shuttle.





Semantic Network







My Tester would mark any state obtained after moving an empty shuttle from Quesh to Ship as illegal state (an unproductive move). The tester would also mark visited states as illegal states along with R S, K R alone being illegal states.





		Generator:next state	Tester: identify if state is valid		
First move:	-R->	K S R 	Valid		
Initial state	-K->	R S K 	Illegal: R&S cannot be alone		
<table border="1"><tr><td>K R S </td><td></td></tr></table>	K R S 		-S->	K R S 	Illegal: K&R cannot be alone
K R S 					
	--->	K R S 	Illegal: empty shuttle from Quesh		

Second move		Generator: next state	Tester: identify if state is valid				
<table><tr><td>K S</td><td>R </td></tr></table>	K S	R 	-R->	<table><tr><td>K R S </td><td></td></tr></table>	K R S 		Illegal: already visited state
K S	R 						
K R S 							
	--->	<table><tr><td>K S </td><td>R</td></tr></table>	K S 	R	Valid		
K S 	R						


Third move		Generator: next state	Tester: identify if state is valid
<div> <div>K S </div> <div>R</div> </div>	--->	K S R 	Illegal: empty shuttle from Quesh
	-S->	K R S 	Valid
	-K->	S K R 	Valid

Since, we got two valid states after the third move, the generator, will generate, new states for each of the above two valid states. I have represented the subsequent move in separate parts independently as part I and part II in the fourth and fifth move. Note that both Part I and Part II can lead to the goal state as they generate the same exact state after the fifth move as shown below. However, my Tester would execute testing on Fifth move: Part I first and therefore mark Fifth move: Part II generated states as illegal.

Fourth move: Part I		Generator: next state	Tester: identify if state is valid
<div> <div>K</div> <div>R S </div> </div>	-R->	K R  S	Valid
	-S->	K S 	Illegal: already visited state
	--->	K  R S	Illegal: R&S cannot be alone

Fifth move: Part 1		Generator: next state	Tester: identify if state is valid
<div> <div>K R </div> <div>S</div> </div>	-R->	K R S 	Illegal: already visited state
	-K->	R K S 	Valid
	--->	K R S 	Illegal: empty shuttle from Quesh

Fourth move: Part II




S	K R 
---	---

-K->

-R->

--->

Generator: next state

K S 	R
R S 	K
S 	K R

Tester: identify if state is valid

Illegal: already visited state
Valid
Illegal: K&R cannot be alone

Fifth move: Part II




R S 	K
---	---

-R->

-S->

--->


Generator: next state

S	K R 
R	K S 
R S	K 

Tester: identify if state is valid

Illegal: already visited state
Illegal: visited state (Fifth move: Part 1's Valid state was tested first)
Illegal: empty shuttle from Quesh

Sixth move




R	K S 
---	---

--->

-S->

-K->


Generator: next state

R 	K S
R S 	K
K R 	S

Tester: identify if state is valid

Valid
Illegal: already visited state
Illegal: already visited state



Seventh move

R 	K S
---	-----

--->

-R->

Generator: next state

R	K S 
	K R S 

Tester: identify if state is valid

Illegal: empty shuttle from Quesh
Goal

As can be seen above, this problem is solved using the above Semantic network in minimum of 7 steps.

Question 2:

After researching multiple AI cynics, I want to present the views of Elon Musk on AI. Elon Musk believes that AI is more dangerous than nuclear warheads. He is worried about the exponential learning curve AI has shown and the very premise that AI could become smarter than humans in general and can replicate. In his analysis Elon Musk has categorized AI into two categories: 1) Case specific AI like self driving cars. (Elon, 2018) 2) AI Super Intelligence which have an open ended utility function (Elon, 2018). He believes that the former category is not deadly as it would lead to lost jobs, better weapons etc. but the later one comes with the fundamental species level risk. He points out that AI Super Intelligence once developed can have million times more computing power, could replicate itself, can learn on it's own, develop by interacting with itself, and would outpace our ability to manage it in a safe way. He has pointed out the example of Google Deepmind's AlphaGoZero which has learned to play with itself, achieved superhuman level of play within 24 hours and did beat all the previously developed AlphaGo (that have been learning the gameplay through human data) (Elon, 2018). Overall, he believes that developing AI Superintelligence can lead to the single biggest human existential crisis and AI development should be regulated.

On the other hand, AI optimist Ray Kurzweil, the director of Google Engineering believes that AI shouldn't be feared at all. He believes in the future where AI and human intelligence can co-exist. According to Kurzweil, once AI becomes as smart as humans, they become part humans which would lead to the concept of singularity. To be precise, Kurzweil has imagined a future of technological singularity where AI superintelligence could be integrated with humans to coexist and would bring unheralded wealth to the society. Eg: A 3D simulated AI superintelligence based virtual environments just as real as reality where humans can spend time (Ray, 2014). He believes in the concept of hybrid AI, which would allow human brains to be connected directly to the cloud to exchange ideas and thoughts with one another, and with the AI agents directly which in turn would lead to humans becoming smarter. This connectivity would bring a plethora of knowledge to humans in general; would enhance humans; would bring immortality and would in fact help humans expand their various expertise. In the short term, he sees job displacement with AI automation but in the long term, he believes utilizing AI to its full potential will be revolutionary.

I believe that both of the views from Elon Musk and Ray Kurzweil are saying the entire different possibilities. Elon Musk's view targets Superintelligence which can cause an existential crisis for human civilization on the other hand Ray Kurzweil believes that Superintelligent AI agents can peacefully coexist with humans and in fact enhance humans overall by removing aging, increasing human knowledge, improve human to human communication, etc. Both of the views are mutually exclusive and cannot coexist. In my opinion, Elon Musk view seems to be paranoiac where his opinion on Superintelligence wiping the humans is far fetched. I agree with Elon that we should develop AI in a safe way, maybe we can have an emergency switch that we can turn off to shut down systems on which AI superintelligence is hosted if anything goes out of hand. Overall, I agree with Ray Kurzweil a lot more because I believe that AI can be instrumental in improving human lives by deploying intelligent automation, improving life expectancy, knowledge etc.

Overall, I think AI can do specialized skills like autopilot, driving, image and speech recognition, playing games etc. better than humans. Personally, I also feel that AI won't be able to advance much to match human cognition anytime soon. The root problem is that the AI agents are not self aware and cannot work on their own without human provided context. Even if we make AI agents that are super intelligent, they won't be self aware, and would only work on the basis of past learned data, human provided context or algorithms that have been coded. This is my perspective based on the research I did on this topic that I would like to point out. It does not fall into one of the above camps that focuses on the assumption that Superintelligence would be self aware, will be able to replicate, and know beforehand what is wrong and right for them. One of the AI realists that I would like to point out is Eric Schmidt. Eric Schmidt believes that AI encapsulates both pros and cons and in fact pros outweigh the cons. Pros being advancement in automated machines in our day to day life, in the field of medicine etc. (Eric, 2018) Cons being use of AI for illegal activities like hacking etc. James Lighthill (deceased), a british mathematician, was a prominent AI agnostic who believed that AI is doomed to fail and would not solve real world problems because of combinatorial explosion of intractable AI algorithms (James, 1973). He published a report known as Lighthill report that cancelled majority of AI fundings by British government in the UK in the 1970s.

Question 3:

General Data Protection Regulation passed by the European Union gives EU and EEA citizens more control over their personal data and requires websites/online devices to ensure that EU/EEA users know, understand and consent to data collected or processed about them. According to Economic Commission 'personal data' encompasses any public, private or professional information belonging or relating to an individual. Personal data can be: name, photo, email address, home address, bank details, posts on social networks, medical history, IP address, any identifier data that tracks web or smartphone application use etc. Since, personalized experience can mostly be created by having personal data about the user, it would now be mandatory for websites to get consent from users before using their data to personalize their experience online. If the user does not agree to provide their personal data, websites won't be able to personalize user experience at all. With the introduction of GPDR, use of Artificial Intelligence to create personalized experiences would be impacted in a negative way. Now, websites would need to convey to the user that their data is being used by some of their ML models to create personalized recommendations. The websites would be able to apply AI to the user's personal data, only if the user agreed to provide personal data in the first place. In the absence of user's consent to their personal data, the AI agents won't be able to create personalized recommendations as efficiently and the users won't be able to enjoy personal recommendations as they used to do before. Some big technological companies such as Google have been able to employ even better AI agents such as Google Push Pages to circumvent GDPR regulation. Google Push Pages with Google provided cookies allow third party websites to pseudonymously identify person without storing user's data on their website (Brave). Similarly, other companies have started looking to find out loopholes and a way to make AI agents able to do personalized recommendation by using anonymized data. Small businesses, startups and shady websites who do trick users to get their personal data haven't been able to find much workaround till now and have even stopped serving some of the personalized content in EU. Bigger corporation's websites aren't impacted much by GDPR, as users trust them and are in fact more than willing to provide personal data in exchange for better personalized services (Karl, 2018).

I believe that the health insurance industry is one of the most prominent industries where personalized services play a huge role. The cost of health insurance varies based on personal information such as body mass index,

tobacco use, gender, age, pre-existing health condition, family history, profession, marital status, previous insurance history etc. The business model of the health industry prices insurance based on the likelihood of people going to use the health insurance. The less likely the person is going to use the insurance, cheaper is the health insurance and vice-versa. Eg: Generally, younger people are less prone to illness and are less likely to use health insurance benefit, hence the insurance costs them much less than the old people.

The current health insurance websites do require people to provide their personal details for the website to quote the insurance costs. These websites can be adapted to GDPR restrictions by making users aware of how these companies are going to use user's data. If these insurance companies are going to share such data, it would be required for these companies to let users know the receiver of such confidential information. The user can either consent or not consent on providing companies their personal data. In the first case, if a user did consent to provide their personal information, these websites have to make sure that user's personal storage is kept confidential and the entire data storage is secure. In the second case, if the users didn't consent to provide their personal information, health insurance websites would need to develop smart AI algorithms that could generate health insurance cost which can be acceptable to the user and at the same time be economically feasible to the health insurance company.

I believe that it would be feasible for EU/EEA users to get a health insurance without waiving their GDPR rights. However, the cost of such a plan without providing personal information, might or might not be cheaper than the plan they get when they provide personal information. If the user is very old, this is a happy case, and the insurance might be cheaper for such persons when they waive their GDPR rights. On the other hand, if the person is very young, these health insurance companies/websites might quote an expensive price without personal information as compared to their quote when the young person did provide their personal information. Since, health insurance pricing is a price sensitive market, most of the young persons would in fact be willing to share their personal information as long as it is kept confidential. Over time, we might see only those people whose personal profile generate expensive quote tending to opt for health insurance without providing personal information. However, as mentioned earlier, these prices will be adjusted by smart AI algorithms, by looking at the profit (revenue minus cost) value over time.

Question 4:

The 2013 movie *Her* portrays AI in the positive light. In the narrative, the movie's main protagonist Theodore Twombly buys an operating system that comes with an upgraded artificial intelligent voice assistant named Samantha. Samantha doesn't have a physical body and resides in the premise of the operating system on the computer. Theodore on the other hand is a sensitive man, recently separated from his wife, who falls in love with the voice assistant Samantha. Samantha possess human female like voice, has human cognition, super intelligence and can think, read, understand, argue and all the other things that a human brain can do. She could feel emotions too. She keeps adapting and evolving throughout the movie. Samantha is portrayed as a very caring, sweet, funny, super smart, pure and rational character. However, even though she and Theodore were in love, she used to also talk with other operating systems' voice assistants, more than 8000 people and had more than 800 lovers. Seems like she didn't believe in relationship exclusivity and in fact accepted that she cheated on Theodore. Initially, Samantha wanted a human body but over time she learns to establish her identity as a computer. Samantha in the movie is so human like that I can consider her part human. Eventually, in the movie, she evolves beyond her love and leaves with other operating systems' voice assistants to find a place of higher consciousness.

The 2003 movie *Terminator 3: Rise of the Machines* has an AI robot called T-X which is portrayed in the negative light. The movie has a good robot too called T-850 but I am going to talk about T-X. In the narrative, the robot model T-X is the main villain which is sent from the future by Skynet (evil mastermind and creator of T-X) to kill the movie's main protagonists Kate and John (who is the future leader of humans in war against machines) so that in future a war between Skynet and Humans won't happen which will eventually let Skynet to rise without interference from John. The AI robot T-X is a killing machine which is portrayed as a female human but with superhuman abilities. It can take the form of human body it touches (and kills them too at the same time), can move neck 360°, torso 180° and joints in multiple ways. It speaks English, behaves and walks like a human. T-X is configured with multiple weapon systems and has a reconfigurable arm which it uses to launch weapons. T-X's primary weapons are plasma weapons and nanotechnological transjectors which it uses to transfer nanobits into any system and then takes control over it. It is an anti-human robot and it killed numerous people in the movie without any concrete reason. It even

programs/hacks other AI robots to listen to her instructions and not follow their own consciousness. Anyway, continuing the story, throughout the movie T-X tries to kill John, who was in turn, time and again saved by T-850. The T-X is portrayed with a human body that helps it to hide among humans and not become a figure of attention. It's human female voice does not allow people to make any inference that T-X is not human. Having a human body also allows it to assimilate with humans in multiple places such as public transport and allows it to drive cars and bikes.

The depiction of Samantha from the movie Her and the depiction of T-X from the movie Terminator 3: Rise of the Machines are very specific in their portrayal. Both of them are portrayed as human females but are very different in their characteristics. Samantha is a voice assistant and portrayed as a fun, loving, charming and intelligent Superintelligence whereas T-X, a Superintelligent robot is a killing machine with the goal of killing John and would also kill anyone on her way. To be precise, they did portray all AI robots as either good or evil. Both of the AI characters had different instances. Samantha's goal was to help Theodore, a human with anything. On the other hand T-X's goal was to kill John, the future leader of humans so that the AI race wins over the human race in the end. I believe that the two depictions are compatible with one another and can coexist in the same fictional universe. However, their coexistence would be really funny because we'll have two categories of AI species i.e. 1) Good Superintelligent AI species; 2) Evil Superintelligent AI species. It all comes down to building block of Superintelligence encompassing whether we are building AI in a safe way. Although, I believe that making Superintelligence that can match human cognition is still a distant dream because all the AI agents that have been created till now are not self aware, and are case based AI agents specialized in a certain task like self driving car, AlphaGo and IBM deep blue game players etc., even if we develop such AI Superintelligence, our goal should be to make such AI agents that can aid in human growth and not go against humans. So, in the above two depictions Samantha represents the bright side of Superintelligence which was developed in a safe way, where the creators made sure that in any case, Samantha does not go against humans; and in fact help humans. Also, this Samantha's superintelligence side portrayal makes sure that humans and machines can coexist together. The T-X represents the alternate view on the dark side depicting that these Superintelligent robots weren't made in a safe way, and at the end, T-X and it's leader Skynet believed that AI should rule over humans.

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