Intelligent Searching: Voice Searches, Machine Learning, and Artificial Intelligence

Abstract

This research paper will discuss how voice searches, machine learning, and artificial intelligence incorporates text analysis, knowledge management, as well as automations in the processes of intelligent search. Advantages of the intelligent search systems will be discussed, but the discussion of the social, legal, and ethical issues will also arise. This paper will research the change in user interaction after being presented with the social, legal, and ethical issues of intelligent search systems that users may not be familiar with.

Introductions

Intelligent searching is a trending topic within the technical world. It is a new way to give direct answers. Some examples of intelligent search systems are voice searches, like Apple's Siri or Amazon's Alexa, artificial intelligence, and machine learning. Although people love their Siri and Alexa, there is a lot of information that is not displayed with these intelligent search systems. There are many negative aspects that people are unaware of when it comes down to these systems. This paper will analyze any social, legal, and ethical issues as well as discuss the type of effect it will have on user interactions if users were notified of these issues.

1. Literature Review

1.1 Voice Search

Voice search is a voice command that the user says to search the internet, a website, or even a mobile app. In other words, voice search has a voice keyword query on any information on the world wide web. An example would be Alexa and Siri (Intelligent Search). How does it work? It is simple! It works by reading the result that is pulled from the user's voice and adds it to the text box, when finished the assistant instantly drops what is asked into the world wide web for an outcome. Also, voice search works well with knowledge management. Knowledge management is defined as a process of using and managing information of an organization.

An advantage of voice search regarding knowledge management would be how it is able to take the users words and search the world wide web for the outcome. This is more efficient and easier to use for the user. Since nothing is perfect in life, it is time to get into some disadvantages of voice search, one of which being that the device is "always on." Many users are not aware that for a

device, such as Apple's Siri and Google's Alexa, to recognize the user's voice they must always be up and running. Yes, this means that the devices are always recording/listening and waiting to hear you call its name. In the article "Social and Ethical Concerns of Smart Voice-Enabled Wireless Speakers" by Jozef Jarosciak, he goes on to explain the negative impacts of Intelligence personal assistants. He explains how IPA's like Siri and Alexa are "always listening" and record everything to pick up the voice call of their names. Data ownership is other preexisting issues he addresses as well. An excellent example of a data ownership concern would be with an ongoing court case in Arkansas. Authorities are demanding the release of all recordings from Amazon Echo device, to investigate a murder case. A search warrant states police can seize anything that they believe could have extracted evidence from the scene. There will be more discussion on where the information is stored and how it is being used.

1.2 Machine Learning

Machine learning is a type of artificial intelligence used to provide systems the ability to automatically learn and improve from experience without needing programming.

One of the advantages to machine learning is that they focus on the development of computer programs that get access to data that use it to learn for themselves.
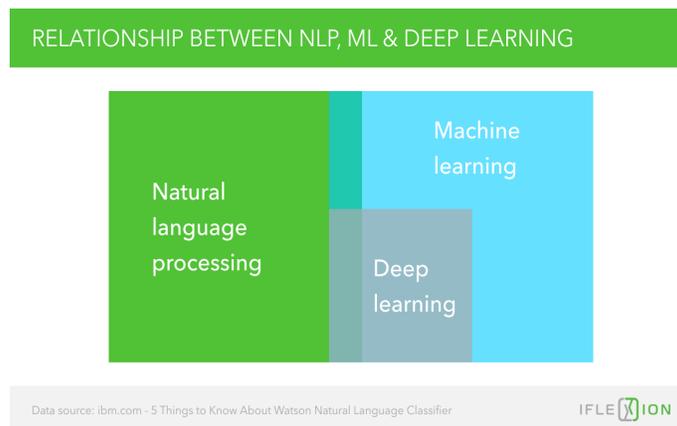

Figure 1 Kuflinski, Y. (2019, August 13). Extracting Meaning: The Convergence of Machine Learning and Text Analysis. Retrieved September 16, 2020, from https://www.iflexion.com/blog/machine-learning-text-analysis

Text analytics is another benefit with machine learning. "Extracting meaning: The Convergence of Machine Learning and Textual Analysis." is an excellent source to depict the relations between textual analysis and a form of an intelligent search system, machine learning. Textual analysis is the automated process of using artificial intelligence to detect important information. The article explains how machine learning works hand in hand with textual analysis. Machine learning deciphers the physical texts for the textual analysis to occur. Text analytics is a process of automating large volumes of some sort of text into data for the machine to interpret (The Practical Guide to Textual Analysis). For example, with machine learning, universally one would be able to go to a foreign country without knowing the language and use the machine to interact with others. Essentially machine learning would be able to erase language barriers.
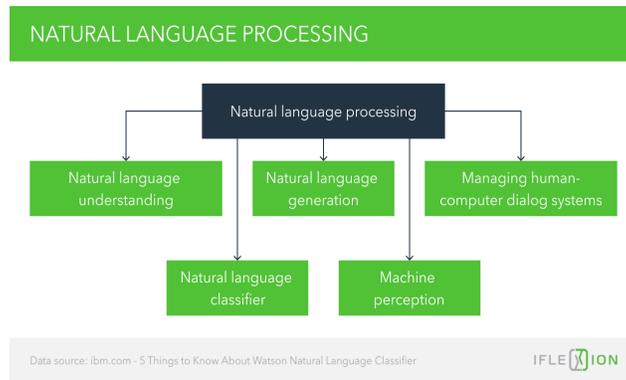
Figure 2 Kuflinski, Y. (2019, August 13). Extracting Meaning: The Convergence of Machine Learning and Text Analysis. Retrieved September 16, 2020, from https://www.iflexion.com/blog/machine-learning-text-analysis

On the other hand, I wonder how you would feel about the price. That is right, the biggest reason as to why we are not able to lift this language barrier is because of how much it costs. You still must take into consideration the fact of how many languages there are, accents, slang, and dialect.

1.3 Artificial Intelligence

Artificial intelligence is defined as a type of science through computing that emphasizes intelligence of machines, to think and work like humans. Some advantages would be speech recognition and problem solving.

Automation is a process where it takes over human labor activities and changes them to where it can be done by technology. When automation and AI come together, they create something called an intelligent process automation, also known as an IPA. IPA are powerful tools because you are merging the benefits of automations and artificial intelligence (Kuflinski,2019).

Yet, benefits are not the only thing that is being merged. Automations and Artificial intelligence create a negative social issue. Artificial intelligence and automations are deemed to get rid of and take over many American jobs, leaving American citizens jobless. It will raise the unemployment rate of the nations and affect many families negatively. The article "Automation and AI are coming for IT jobs. Here is how to keep yours. "by Sid Suri is an article that gave a lot of insight to some negative aspects of both intelligent search systems and automation. This article exemplified a connection between automation and artificial intelligence. It also expressed the similarities between both topics through the negative impacts they have socially. This article provided us with predicted statistics of job loss caused by automations and AI. The article states "artificial intelligence (AI), machine learning, and automation will replace 7% (or 22.7 million) jobs in the US alone" (Suri) by the year 2025. This article begins to discuss some of the future effects that automation and AI (an intelligent search system) will have on current and future jobs. The article proceeds to discuss a few tips and tricks to maintain a job and try not to lose it due to automations and a form of intelligent search systems.

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Research Question:

Will user interaction change significantly if users are aware of the social, ethical, and legal issues intelligent searching systems have?

Null Hypothesis:

Users interaction will have a significantly decrease if users are aware of the social, ethical, and legal issues intelligent searching systems have

2. Method

2.1 Participants

Participants (n=60) were randomly selected. Since the research was broken up to three different parts, there were 20 participants in each part (which makes up the 60 total participants).

2.2 Apparatus

The research was split into three different research parts to help understand a general decision from possible consumers.

The different parts were broken up by specific technology. There were three different parts. The first part was about voice search systems. The second part was about machine learning. Finally, the last part was on artificial intelligence. All parts touched on the social, legal, and ethical issues they may consist of.

2.3 Procedure

For the procedure, we will have sixty participants and be breaking those sixty into random groups of three (twenty participants per group).

Group A will be dealing with voice search. Group B will deal with machine learning, and Group C is on artificial intelligence.

Half the participants will already be informed of the social, ethical, and legal issues related to their group's topic. Each group will be asked a series of questions that is also related to their group topic.

For group A, the participants will be asked the following:	For group B, their questions will be a little more indirect like:	Finally, Group C. Group C was asked more broad questions like:
Would you buy a voice search machine (Google home, Alexa) for your home? *Is Siri enabled on your phone?* *Are voice searches always listening?*	*Do you use Facebook?* *Do you know how/ where data is stored on Facebook?*	*Would you buy a self-driving (electric) car?* *Do you know how they drive themselves?* *Do you trust self-driving cars?*

3. Results

3.1 Results of Voice Searches

3.1.1 Social

There is data from voicebot.ai that says that voice search device purchases in the United States has risen by 40% in 2018 to a total of 66.4 million with most of that number being Amazon Echo products. From this information we gather that people are either willing or do not know about the data gathering involved in voice search devices. We can also gather from some additional data that young people use voice searches more often than old people as visualized in the image below.

Figure 3 Kinsella, B. (2019, March 07). U.S. Smart Speaker Ownership Rises 40% in 2018 to 66.4 Million and Amazon Echo Maintains Market Share Lead Says New Report from Voicebot. Retrieved October 16, 2020, from https://voicebot.ai/2019/03/07/u-s-smart-speaker-own

With this added information, younger people using voice search more than older people can see that younger people are more likely to accept the loss of privacy in favor of convenience where older people are either less likely or more informed. Current trends show that every concurrent generation is more accepting of voice search technologies than the previous generation. However, there is some conflicting evidence that shows a decline in overall voice search use had declined from 2017 to 2018 with given statistics from econsultancy.com that can be seen in the infographic below.

Figure 4 Sentance, R. (2019, November 20). Voice search was less used and less trusted in 2018 than in 2017, study finds. Retrieved October 16, 2020, from https://econsultancy.com/voice-search-study-usage-trust-declining/

As seen from the graphic there is a significant change in the amount of people who never use Voice searching where in 2017 29% fell into this category but into 2018 40% of people reported that they never use voice searching.

3.1.2 Legal

The legal repercussions of voice search technologies can be seen in Congress where every year seemingly Apple, Google, and Amazon all have to go talk with congress and defend their legality of a myriad of systems with voice recording data being one of the major ones. With these growing conversations within Congress and the growing concern over these companies' knowledge of the public signifies that we will see some sort of legal changes with voice searching devices with future regulations.

3.1.3 Ethical

Ethical implication of taking data with the voice systems are very apparent being that taking peoples' data without clear consent is ethically wrong as it puts people into categories and is causing divides in people by making essentially tribes that war over their ideals. All this through use of data collection via voice searching devices.

3.2 Results of Machine Learning

3.2.1 Social

The Cambridge Analytica scandal with Facebook had major implications on how machine learning is used to organize the data of searches of Facebook and their various groups in order to influence the election in 2016 by Russia. The direct involvement in every facet of social media clearly affects how we socialize with one another. As a result of these facts the public based on the below survey done on deleting Facebook after learning of Cambridge Analytica findings. From these results public trust in social media has fallen after they learned about how machine learning interfaces with their social lives and politics.
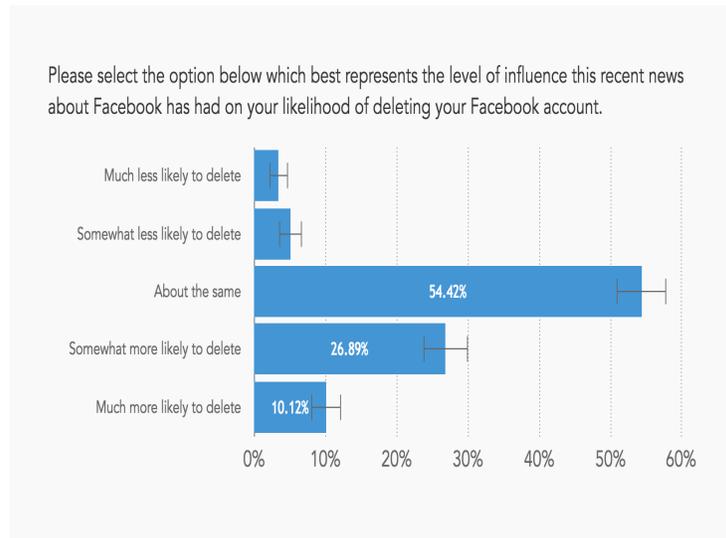

Figure 5 Duck, D. (2018, July 16). What U.S. Adults Think About Facebook After Cambridge Analytica. Retrieved October 16, 2020, from https://spreadprivacy.com/cambridge-analytica/

3.2.2 Legal

Major legal problems regarding machine learning are that these machine learning algorithms generally are "black boxes" where it's impossible to see how they really work and function and may be impossible to know why a machine learning algorithm has made a decision. And the legal problems that can come from the fact that, how can you put legal action against machine learning where the code that is made is Generated by other code through inputs and parameters, what part can congress write laws on when everything is hidden.
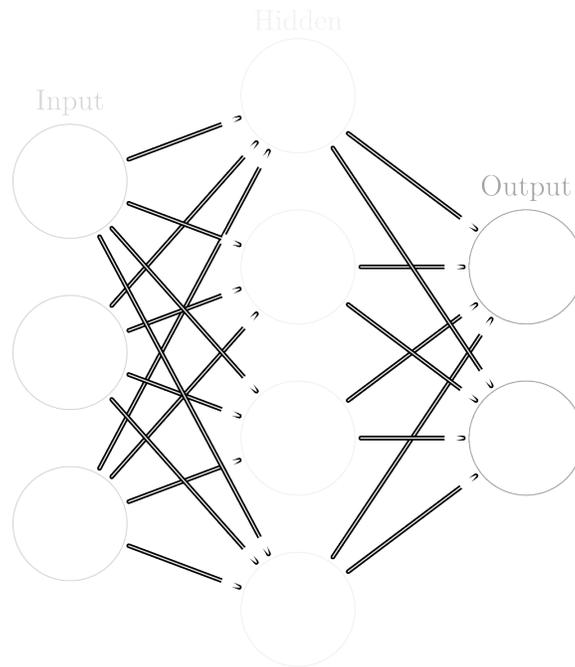
Figure 6 The Practical Guide to Textual Analysis. (n.d.). Retrieved September 16, 2020, from

3.2.3 Ethical

Machine learning can create algorithms in social media that caters to the Ideas that an individual agrees with as well as articles that enrage a given individual. The ethical implications of this are obvious as machine learning, based on algorithms, is currently forcing people's feeds to show device information rather than well-thought-out middle ground information. This leads to people gathering in groups and damaging societal acceptances. All these implications come from machine learning and there needs to be a system in place that prevents these machine learning negatives.

3.3 Results of Artificial Intelligence

3.3.1 Social

Artificial Intelligence such as self-driving car technology will affect the workforce both positively and negatively impacts on social life. The positives of Artificial Intelligence would be that jobs that are hard on people and undesirable such as truck driving, taxi driving and even extending into fast food will all be either enhanced or replaced by Artificial Intelligence. Additionally, the way that we travel from point A to point B is ever-changing thanks to Artificial Intelligence as shown by the increase in autonomous car sales as shown below. The negatives of Artificial Intelligence are that it will take away lots of low skill entry level jobs potentially making it harder to find a job if there is not enough demand for the given labor.

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Autonomous Car Sales Will Surge By 2035
The cars will represent 25 percent of the global market

■ Partially autonomous cars ■ Fully autonomous cars

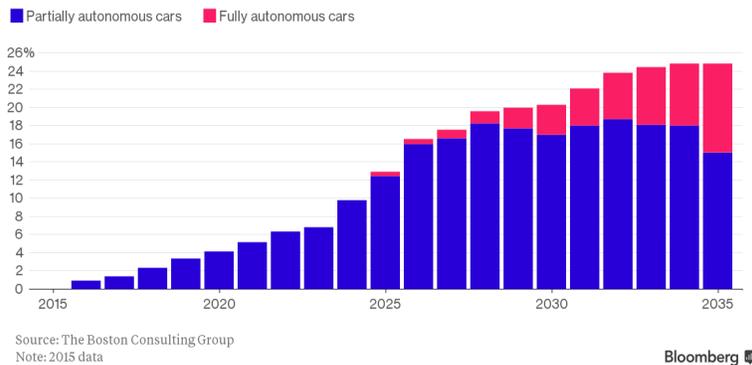Source: The Boston Consulting Group
Note: 2015 data

Bloomberg

Figure 7 Forum, W. (2017, June 20). The Most Revolutionary Thing About Self-Driving Cars Isn't What You Think. Retrieved October 16, 2020, from https://www.forbes.com/sites/worldeconomicforum/2017/06/20/the-most-revolutionary-thing-about-self-driving-cars-isnt-wh

3.3.2 Legal

The legality of Artificial Intelligence self-driving cars. There is also the question of if Artificial Intelligence laws should either apply as some new Artificial Intelligence laws will need to fall under human laws if that scenario comes to pass. Also, should there be laws in place to protect workers from job replacement from Artificial Intelligence or to move them on to alternative jobs, this question starts to fall into the ethical category. However, we can see that Artificial Intelligence brings with it more questions than answers.

3.3.3 Ethical

The ethical implication of Artificial Intelligence self-driving cars and other Artificial Intelligence technologies are Mostly up for debate still. However, it can be said that no matter what side of the aisle the debates on how to handle the ethical dilemmas of Artificial Intelligence the answers surely fall somewhere in the middle as most things do.

4. Concise Summary

Finally, Intelligent searching is a gravitating topic within the technical world. It is a new way to give direct answers to a multitude of scenarios. Voice search is a voice command that the user says to search the internet, a website, or even a mobile app. Once again, a few examples of voice search would be Apple's Siri, Amazon Alexa, and Google home. They must always be up and running. Yes, this means that the devices are always recording/listening and waiting to hear you call its name. This is just one of many ethical issues that come along with voice search. Next is machine learning. Machine learning is a type of artificial intelligence used to provide systems the ability to automatically learn and improve from experience without needing programming. One

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of the many advantages to machine learning, is that it focuses on the development of computer programs that get access to data that use it to learn for themselves. Pricing would be the biggest downfall to machine learning! Lastly, Artificial Intelligence was the last thing discussed. AI is defined as a type of science through computing that emphasizes intelligence of machines, to think and work like humans. Some advantages would be speech recognition and problem solving. Unemployment is the biggest ethical problem surrounding AI, due to the advancement of robotics it will take care of everyday jobs that do not require a degree of some sorts. These three things will lead and destroy the world all at the same time. How do you think this will impact your everyday life?

Extended Resources:

1. This source explains and defines what Artificial Intelligence is.

https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence

2. This is an article that explains how to stop a google home from listening and storing information you may not want to be stored.

https://www.businessinsider.com/how-to-stop-google-home-from-listening-to-me

3. Article explains and defines what Machine Learning is.

https://www.technologyreview.com/2018/11/17/103781/what-is-machine-learning-we-drew-you-another-flowchart/

4. This is a YouTube video that shows a user in a self-driving car

 https://www.youtube.com/watch?v=__EoOvVkEMo

5. This is a YouTube video on Sofia the first robot to claim citizenship in Saudi Arabia

https://www.youtube.com/watch?v=E8Ox6H64yu8&feature=youtu.be

6. News article on a man who hacks a ring camera in an 8-year-old girls' bedroom.

https://www.nbcnews.com/news/us-news/man-hacks-ring-camera-8-year-old-girl-s-bedroom-n1100586

7. An article/survey on Americans who are afraid that A.I will take over their jobs.

 https://www.cnbc.com/2019/11/07/these-american-workers-are-the-most-afraid-of-ai-taking-their-jobs.html

8. An Article on ethical concerns dealing with A.I.

https://news.harvard.edu/gazette/story/2020/10/ethical-concerns-mount-as-ai-takes-bigger-decision-making-role/

9. An article discussing if Machine Learning is ethical.

https://plus.maths.org/content/what-can-we-use-machine-learning

10. An article discussing issues with voice search systems.

https://econsultancy.com/the-problem-with-voice-user-interfaces-like-amazon-alexa/

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