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**UM-Dearborn CIS-479\_RETAKE**

**HW\_3\_EXTRA**

**With Prof. Dr. Shengquan Wang**

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# 1) [DDC2.0-I1, minimum 150 words] Compare and contrast the advantages and disadvantages of human learning as compared to machine learning.

Some of the obvious advantages with artificial intelligence and machine learning is that machine learning is based on data and computers are able to acquire and analyze data in large amounts much faster and efficiently under specific contexts. That is why machine learning is often used in industrial applications such as mass production operations. The problem with machine learning is that it relies on large amounts of data, and it is not good at making generalizations with smaller quantities of data like the human brain can (Tan, et al., 2022)[1].

It is easy for a machine learning model to become corrupted or influenced negatively by some of its data parameters and create dangerous situations for humans. these are some of the primary hurdles for using machine learning for driving and autonomous vehicles. Because machine learning models currently do not have the ability to quickly adapt under very dynamic environments that contain rare events, and which could be subject to sabotage events, in my estimation there will always need to be strong human machine dependency. Artificial intelligence and machine learning is especially useful for automated redundant repetitive tasks especially in environments that are less dynamic and even still requires human intervention and oversight (Tan, et al., 2022)[1].

# 2) [DDC2.0-I2, minimum 150 words] Describe why the diverse nature of persons and cultures around the world might limit a developer’s ability to create an intelligent system that relies on [Schank’s notion of scripts Links to an external site.](https://en.wikipedia.org/wiki/Script_theory)to guide an intelligent system in the interpretation of a series of related events.

The predictability of languages, people, and culture can make Schank’s notion of scripts feasible, but very limited. This is because although human behavior is predictable (scriptable, as Schank calls it), it is still very dynamic and has a large range of rare events that the human is able to correctly interpret but that a machine would lack that ability as it is relying solely on the script.

This dynamicity stems from that fact that there are so many languages, peoples, and cultures. Even among humans we can misinterpret or misrepresent the outcome of some event based on our failed generalizations about a culture group, but we can still do it much better than machines, who scripts never really change. Yes, the machine can use the data to adapt to the dynamics of human behavior, but the collection methods and representation of that data is essentially fixed.

Humans have the ability to collect data, analyze it under a framework, and adapt what the data means in a different interpretation or choose another measurement method altogether. That is not to say perhaps we cannot find a way to develop machine learning to do this, as it does to some degree as mentioned, but perhaps we can make it closer to human capabilities.

# 3) [DDC2.0-I3, minimum 150 words] Under what circumstances it is appropriate to rely on the advice of an intelligent system, if the user of the system is not an expert?

Often times, there can be very advanced human vehicle integrated control systems such as flying a jet or airplane helicopter mining machinery etcetera. As I mentioned earlier in this paper, the human-machine interdependency is essential for the operation of such vehicles or similar applications even if the user is already an expert. For example, went up fighter jet pilot takes off he has to rely on the feedback of his intelligence systems built into the jet. It is impossible to gather all of the data necessary to fly the jet without the computer/machine learning system, and it is impossible for the machine alone to make the right decision in all possible volatile and inevitably unseen or rare circumstances.

As another example, airplane pilots are relying so heavily on the computer system with machine learning/AI built into it that they often do not know what to do themselves when things go wrong (<https://www.dailymail.co.uk/news/article-2516832/Pilots-rely-heavily-guidance-fly-planes-unprepared-things-wrong-warn-aviation-experts.html> ). Nonetheless, they can still perform better as a human than the system alone because humans are better at generalizing than the machine is. Even if the plane was only piloted by a human, the human still needs to adapt to the rare event, so if a machine fails and the pilots are not sure what to do, it is really normal, and they will have to use their best judgement as with any circumstance.

# 4) [DDC2.0-I4, minimum 300 words] Pick a domain you are familiar with for potential AI application. Address in details what kinds of issues exist in the design and what potential solution can be adopted.

Interestingly enough, I am currently helping to conduct research with vehicle and drone autonomous system collaboration using edge computing concepts. Some of the issues as I mentioned before with autonomous vehicles and drones are the rare circumstances that the machine that is trained for certain environment would not be able to overcome. However, there are still many applications that can be adapted for human machine collaboration for example one idea includes using drone swarms to warn drivers to stop for a path that is being routed for emergency vehicles.

Some of the major challenges is finding equivalent functions among different types of devices that would make up the network and how they collect their data for machine learning analysis. The data needs to be accurate otherwise the analysis will be not as useful. Also, drone collision detection and avoidance is a major concern. This is because aside from large obstacles like walls, there can be objects such as people, poles, bridges, etc. that the drone needs to analyze to accurately divert and avoid collision. This requires a machine learning model so that the drone can learn to adapt and learn about new types of possible collision scenarios.

In order to overcome this, we would need to train the drone in various environments including in the dark, and around all types of obstacles, shadows, etc. It will not be perfect because of the limitations as discussed earlier, but machine learning and AI can definitely reduce collision greatly (Wang, et al. 2021).References

[1]Samson Tan. Araz Taeihagh. Kathy Baxter. “The Risks of Machine Learning Systems”. 2022.

[2] Yingjian Wang, Jialin Ji, Qianhao Wang, Chao Xu and Fei Gao .“Autonomous Flights in Dynamic Environments with Onboard Vision”. 2021.