Emerging and Game-Changing Technologies

There have been rapid advancements that have been made in technology for the last couple of decades. There have been technological and societal developments, advancements in technology have been made, there have been technologies that have caused a disturbance in society. For example, the two disruptive technologies that continue to shape the model world are Artificial Intelligence and Machine Learning. I understand that my last journal entry was also about the two mentioned topics, but I think that AI and ML are such broad topics that have a lot to discuss and touch upon. And secondly, I will discuss the impacts of Blockchain Technology. These technologies haven't just revolutionized the way businesses function, but they have also caused a new wave of possibilities for what could happen in the world of computation, automation, data processing and its impacts on the world. AI and ML have introduced various levels of automation and intelligence to various industries, while Blockchain has been able to redefine what trust and transparency is in digital transactions.

Artificial Intelligence and Machine Learning are the subsets of computer science that focus on building and creating intelligent systems that are capable of learning from data, making decisions and improving over time. AI is a very broad concept, which works as the foundation of fields that are related to artificial intelligence, while ML is a chain that is a part of AI, it enables computers to recognize patterns and improve performances. ML is also divided into different sections, such as supervised learning (algorithms are trained), unsupervised learning (identifying patterns in unlabeled data) and reinforcement learning (agent learns through trial and error). These technologies have transformed industries such as healthcare, finance, and retail. For example, in healthcare there are AI-powered diagnostic tools that support medical professionals to detect diseases with higher accuracy and efficiency. ML has also been contributing through having algorithms specifically enhancing areas in the medical system. For example, with ML

algorithms, through deep learning models, it has been able to enhance medical imaging analysis, enabling faster and more precise detection of anomalies. Also, predictive analytics that is used in ML can help with forecasting disease outbreaks and patient deterioration which helps preventative healthcare. A study that was done by Topol in 2019, found that AI is able to diagnose certain medical conditions like diabetic retinopathy and skin cancer, with either the same or better accuracy in comparison to human doctors. And in the field of finance, financial institutions leverage AI for fraud detection and risk assessment, through using predictive analytics to anticipate any possible threats that could occur. ML models have been able to detect suspicious transaction patterns, which reduces financial fraud, all through analyzing vast amounts of datasets. And in the field of retail, retailers will use AI-driven recommendation engines to enhance customer experiences through personalization through searching through history and purchase behavior.

Blockchain technology was originally developed as the underlying foundation for Bitcoin, which has now evolved into a very revolutionary system to secure and decentralize transactions. A blockchain is a distributed ledger that records transactions across multiple computers in a secure and a tamper-resistant manner. This innovation has gone through applications beyond only cryptocurrency, by helping industries like supply chain management, healthcare, and finance. Blockchain technology ensures that there is constant data integrity, enhances transparency and reduces risks of fraud through removal of intermediaries in transactions. For example, blockchains can also be used in the field of healthcare, it is used to secure patient records and enable interoperability between different providers that are involved. According to a study that was conducted by Kuo, Kim and Ohno-Machado back in 2017, blockchain can enhance data security while still allowing patients to control access in regard to their medical records. Also in a company setting, when it comes to supply chain management, companies will use blockchain

to track the origin and movement of goods, ensuring the authenticity and preventing counterfeiting.

The impact of these technologies on the field of computer science and just fields in general are incredibly chocking. AI and ML revolve around skills in data science, deep learning and ethical AI implementation. AI is a constant factor in life and in corporate businesses that there isn't a way to exactly avoid it. As automation continues to replace repetitive tasks or specific tasks, professionals must adapt through learning the environment or the fundamentals of the program. ML engineers focus on building and perfecting models for very specific tasks, which require proficiency in programming and different frameworks. With this, blockchain technology also requires understanding in cryptographic security, smart contract development and decentralized application. There are many companies in the field that are actively investing time and resources in blockchain research to create new opportunities for innovation and career growth. Considering that there are so many developments that are being made in these fields, it pushes the idea that technology is the forefront of future generations. This means that for individuals who are pursuing a career in computer science, there are countless paths that we can take with our background understanding of computer science. It would also mean that there can be more competition because there is a massive growth of the need of technology in every single aspect and field of our society, that everyone will start striving towards an understanding in the field that is required the most.

The societal, global and personal implications of AI, ML and Blockchain are incredibly noticeable. AI-driven automation has improved productivity and efficiency immensely across different industries, but it is not just a positive influence either. The continuous development of AI has impacted the chances of job displacement and ethical considerations as well. Autonomous systems like self-driving cars and AI-powered customer service bots have reduced the

operational costs but all the while, it still challenges traditional employment models. There will also always be privacy and security concerns when it comes to AI and ML, and there is constant discussion on whether AI should be regulated for there to be a more responsible AI development, but if this was too occur, I think that there would be many setbacks occurring in the development of AI due to the many ethical considerations that it must go through. Which is why AI has advanced so much as it has because it doesn't consider every single ethical concern that exists personally and societally. However, with blockchain, the ability to decentralize control over digital transactions has been able to improve the meaning of financial inclusion and individual privacy. By eliminating the need for traditional banking systems and intermediaries, blockchain technology has the potential to empower populations globally and offer them access to financial services that were previously not accessible. And the transparency and immutable nature also helps defeat corruption by ensuring that records cannot be altered retroactively. Obviously, there are downsides, such as the older generation not being able to fully go along with a internet banking system, which also creates another gateway to another portion of the population that doesn't trust internet banking.

The exploration of these emerging technologies aligns with different key learning outcomes based in computer science. Professionals must employ strategies to build collaborative environments that can enable diverse audiences to support organizational decision-making. This ensures that there are levels of inclusivity and leveraging technology to have bettering communication teamwork. Also, effective communication skills are essential, as professionals must design, develop and deliver resources that require different communication skills. Also, designing and evaluating computing solutions requires great understanding of algorithmic principles, data structures and computational terms. AI, ML and Blockchain represent the importance of using well-founded and innovative techniques, skills and tools in computing

practices that can help deliver valuable functions to an industry. Also developing a security mindset when working in fields like AI, ML and Blockchain is important because of the different implementations that it holds. As I have mentioned before, security is imperative when it comes to the protection of AI and those alike. For me personally, I think I have yet to improve upon teamwork and ensuring that I have a secure mindset. I haven't had a chance to work with my peers through my education for computer science, but I know that I will have to do in the future, I think that I am able to perform in a team well, there are instances where teams have to compromise but this all depends on the characteristics and working styles of each individual. Security mindset is an outcome that I must continuously develop, I have put that on the back burner of my mind because I am so focused on the coding, communication and developing part of my assignments or my codes that I don't necessarily think about security because I treat it as an afterthought. I think that if I can allocate more time and resources into thinking about security, I would be able to create a more safe and secure environment.

Part Two:

Checkpoint	Software Design and Engineering	Algorithms and Data Structures	Databases
Name of Artifact Used	Animal Shelter Database – web dashboard	Animal Shelter Database – data processing & retrieval	Animal Shelter Databases – MongoDB implementation
Status of Initial Enhancement	Developed a Dash-based interactive dashboard for data visualization	Implemented a search and filter system to have animal retrieval	Designed MongoDB schema to efficiently store data
Submission Status	Submitted	Submitted	Submitted
Status of Final Enhancement	Completed	Completed	Completed
Uploaded to ePortfolio	Yes	Yes	Yes
Status of Finalized ePortfolio	In-progress	In-progress	In-progress

Citations:

Kuo, T.-T., Kim, H.-E., & Ohno-Machado, L. (2017). Blockchain distributed ledger technologies for biomedical and health care applications. Journal of the American Medical Informatics Association : JAMIA, 24(6), 1211–1220. https://doi.org/10.1093/jamia/ocx068

Topol, E. J. (2019). High-performance medicine: the Convergence of Human and Artificial Intelligence. Nature Medicine, 25(1), 44–56. https://www.nature.com/articles/s41591-018-0300-7