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CS-499-19649-M01 Computer Science Capstone 2025

5-1 Journal: Computer Science Trends and Artifact Update

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Part One:

In this journal entry, I intend to explore two developing trends that are influencing the future of computer science in unique but significant manners.

Q. What is the significance of each trend?

**Artificial Intelligence (AI) and Extended Reality(XR)**

There is no surprise that Artificial Intelligence (AI) is one of the hottest trends in computer science today. Through its ability to create highly sophisticated and human-like content, including text, images, audio, and complex simulations, it is reshaping industries. Businesses have undergone a revolution in their approach to problem-solving, customer engagement, and creative processes thanks to this technology.

On the other hand, we have Extended Reality, also known as XR. The term XR encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), all of which offer a unique blend of digital and physical experiences. Through this technology, learning outcomes are improved, engagement is increased, and training costs are reduced.

Each of these trends represents a separate technological domain, with distinct advantages, and they are all poised to transform technology, changing how we interact with one another, our surroundings, workplaces, everyday activities, and our overall reliance on computing systems. By examining these two trends, my goal is to highlight their significance, potential implications, and relevance to my future career in computer science.

Q. How will each trend change the field of computer science?

**Extended reality** will lead to a fundamental transformation in computer science. With the advent of XR, computer science is being pushed in several ways, including new methods of accessing and utilizing information, interacting with 3D data, and driving innovation in areas such as cloud computing and application development. As a result of advancements in core areas such as graphics, computing, networking, and human-computer interaction, and by integrating AI and human-centered design principles, XR is paving the way for more immersive and interactive digital futures. Furthermore, for Real-time Rendering and Computer Graphics, this drives advancements in the use of ray tracing and machine learning-based rendering algorithms, as well as advances in computer vision and spatial computing. With XR, data and applications can be viewed in a three-dimensional space, requiring the development of new user interfaces and interactions.

**Artificial Intelligence (AI)**

In the field of computer science, the development of artificial intelligence is ongoing, reshaping the technology industry. To remain competitive in an evolving digital environment, computer science specialists need to acquire knowledge in AI. Artificial intelligence has greatly impacted computer science by setting new benchmarks in problem-solving, automation, and data analysis. In addition to enabling the development of intelligent systems that can learn, adapt, and make decisions, it has expanded the boundaries of what computers can do. It redefines the foundations of computer science by emphasizing data-driven methods and machine learning. The use of artificial intelligence has significantly changed rule-based programming by allowing systems to learn and adapt. Software development increasingly relies on models based on large amounts of data and computational power rather than static code. With artificial intelligence (AI), human-computer interaction is advanced, facilitating collaboration across diverse fields. As AI has evolved, new algorithms, tools, and frameworks like TensorFlow and PyTorch have become essential. These tools are necessary for the development of machine-learning algorithms (Salminen, 204).

Q. How will each trend change the experience of consumers, workers, or citizens?

**Extended Reality (XR)** is poised to have a major influence on people, workers, and consumers by delivering immersive experiences, boosting productivity, and changing our interactions with technology and one another. With XR, people can engage in more immersive gaming, entertainment, and social experiences, which enhances their connection to content and may help eliminate distance barriers in communication. It can offer hands-on learning experiences, such as simulated experiments, virtual field trips, and practical training across various fields. Additionally, XR has demonstrated potential for therapeutic applications, like exposure therapy for anxiety and phobias, and can offer immersive techniques for relaxation.

**Artificial intelligence** is already having a considerable influence on customers, from tailored online interactions to customer support driven by AI. It is anticipated that AI will keep automating routine tasks, allowing employees to focus on more innovative and decision-making responsibilities. In fields such as manufacturing and logistics, where machines can completely substitute human workers, the rise of automation through AI also brings up issues regarding job loss. In healthcare, AI is already enhancing patient care by making treatment plans more tailored and precise (Salminen, 2024). Furthermore, AI is boosting efficiency and sustainability in public services like transportation and smart city initiatives. Artificial intelligence has resulted in face and fingerprint recognition. This technology has, more importantly, saved time since it functions without requiring human intelligence. Furthermore, using voice over technology in daily life encourages you to use digital assistants. Now that the oldest barrier is gone, people prefer voice communication over texting.

Q. How will each trend fit in with your career interests or aspirations?

**XR**:

VR, AR, and MR technologies all align directly with many career objectives. XR is a rapidly growing field with applications across various industries, creating numerous opportunities for people in areas such as development, design, marketing, and leadership. XR content catches my attention because of its visuals and interactive aspects. There are several aspects that fascinate me, including high-quality 3D graphics, spatial audio, and meticulous attention to detail. The depth and realism of XR LED screens cannot be matched. Creating virtual environments that replace a user's surroundings with a simulated world and allowing digital objects to interact with their physical surroundings. This trend aligns directly with my goal of providing immersive learning experiences that boost knowledge retention and problem-solving skills. The field of extended reality represents a rapidly expanding and exciting area of computer science, which provides new opportunities for human-computer interactions and immersive experiences.

**Artificial Intelligence (AI)**

My current professional goals are closely aligned with my aspirations in the field of AI. During my last term, I was intrigued by the revelations about how Artificial neural networks acquire knowledge and the rapid results they produce from provided data. Indeed, AI and Machine Learning are major trends within the job market, with employers increasingly valuing candidates who possess these skills and an understanding of them. I have a particular interest in machine learning and AI-driven technologies within the realms of data science, natural language processing, and automation. My enthusiasm for leveraging AI in business operations and developing more intelligent, personalized consumer experiences is driven by the increasing adoption of AI in various sectors. With a strong passion for innovative and transformative technologies, the adaptability and ongoing advancement of AI make it a perfect match for me.

Q. Which course outcomes have you achieved so far, and which ones remain?

I have made significant progress toward a number of course objectives. I have successfully designed and evaluated computing solutions by applying algorithmic principles to various problems, which align with the outcome of developing solutions that adhere to computer science standards. I have also gained experience in delivering professional-quality communications, such as writing technical reports and giving presentations that are tailored to different audiences and contexts.

With this experience, I have been able to design and evaluate computing solutions that solve a given problem based on algorithmic principles and computer science practices and standards appropriate to its solution, while managing the trade-offs involved in design choices.

Furthermore, I have acquired experience utilizing well-founded and innovative techniques, skills, and tools in computing practices to implement computer solutions that deliver value and achieve industry-specific goals.

Making the connection between classroom work and real-world problems is another major setback. It is essential to note that classroom tools differ from those used in the workplace, so it is crucial to stay current with the constantly changing technology. i am still working to improve my security thinking, especially in terms of knowing how to Develop software using high-level programming languages with built-in security features.

Both AI and XR technologies introduce significant security concerns, making it a critical area for ongoing development and growth. Lastly, I have begun exploring innovative tools and techniques in artificial intelligence and machine learning. However, I intend to learn more about cutting-edge technologies, such as deep learning, in order to develop innovative solutions that will improve efficiency, increase accuracy, and shape the future of many industries.

Conclusion

Both XR and AI will have a substantial impact on computer science in the future, but in different ways. With XR, we have access to increasingly realistic, intuitive, and accessible experiences, while AI is already redefining how we interact with technology and how we operate our businesses. My passion for innovative, impactful technologies aligns with both trends, and by staying informed and developing relevant skills, I aim to make meaningful contributions to these exciting advancements.

Part Two:

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| **Checkpoint** | **Software Design and Engineering** | **Algorithms and Data Structures** | **Databases** |
| **Name of Artifact Used** | Weight Tracking App from CS 360 course  ( Mobile Architecture and Programming) | Animal\_main.py  Animal\_module.py (CS 340: Client/Server Development) | Animal Rescue Dashboard with MongoDB (CS 340: Client/Server Development) |
| **Status of Initial Enhancement** | My goal is to build a well-designed user interface that incorporates account creation and input validation for easy system navigation and understanding of its security measures. Thus, demonstrating my grasp of data visualization and management principles and focusing on user-centric principles. | My goal for this project is to use Indexing, sorting, and CRUD operations that can be performed more efficiently, thus demonstrating my capacity to improve the system's efficiency. I will show my algorithm optimization skill by minimizing unnecessary processes, making the program more efficient. Improvements in data structure efficiency, focusing on optimizing list for quicker lookups | By implementing indexing and aggregation pipelines, I am improving query performance in MongoDB and handling larger datasets. Currently, I am researching optimization strategies but I have not yet finalized my approach. |
| **Submission Status** | I'm working on it, but I require additional time due to the learning curve associated with specific features for newcomers. | Enhancement efforts are underway.. I am still working on few improvements, but they have not been submitted yet. | The submission has not been made yet. As I work on ways to optimize system performance and ensure the best user experience, I've created the database in MongoDB. At the moment, I am researching how to improve the performance of databases without compromising their integrity or security. |
| **Status of Final Enhancement** | As of now, the project is still in progress. I am almost done working on the charts and labels appearance on the weight tracking screen. Besides that, I have started focusing on User interface including the layout, design, typography, and overall aesthetics to make the user’s experience easy and intuitive. | One of my enhancements has been completed, which involves breaking down services into smaller, reusable, and maintainable units that can be deployed separately, such as modules, functions, and classes. Work is still in progress on testing. Using methods that also allows us to access individual elements directly. | Improvements are in progress. To enhanced with additional database features and a more efficient data access strategy. Utilizing aggregation pipelines more effectively and improving query speed. |
| **Uploaded to ePortfolio** | The file has not yet been uploaded. | There is still work to be done on the finalized ePortfolio. | There is still work to be done on the finalized ePortfolio. |
| **Status of Finalized ePortfolio** | Enhancements are ongoing, so the ePortfolio is not yet complete. | There is still work to be done on all categories of the ePortfolio before the final version is ready | There is still work to be done on the finalized ePortfolio. |

**Status Checkpoints for All Categories**

**References**

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