

(a) Machine learning is a subset of AI that relies on disciplines found in statistics, probability, AI and computer science. Machine learning is concerned with adapting to new circumstances and pattern identification.

(b) We need data so that we can train our machine learning agent to learn. We must feed data to models so that the model can begin to recognize patterns in the provided data. The learning in machine learning is done through pattern recognition. Additionally, we must consider proper (or clean) data so that we may get accurate decision making. More accurate models should yield more accurate learning outcomes. Once we organize the data and its patterns, we can then begin to discuss what should have been learned from this data and consult with domain experts for next steps.

(c) Machine learning is considered to be a subset of AI. Where AI is concerned with computational reasoning to match human reasoning and action based on perception. Machine learning is dependent on pattern recognition to improve a model's intelligence. AI takes after human action based on perception while machine learning develops its own intelligence.

(d) Two examples of modern machine learning applications are image/facial recognition and predictive analysis. Image recognition is dependent on machine learning techniques because computer vision relies heavily on human vision, which is heavily dependent on pattern recognition through data such as the pixels that comprise an image. This type of pattern recognition can be hard to define within a traditional algorithm because image recognition is not a clearly defined process human brains can carry out, hence the need for machine learning. Predictive analysis can be accomplished far more effectively and efficiently through machine learning than in traditional programming paradigms because far larger data sets can be accommodated for a deeper analysis.

(e) An observation (also known as an example or instance) is a data point. When on a table, this is commonly oriented as a row. A feature (also known as an attribute or a predictor) is a classification of a certain aspect of a data point. In more simpler terms, when on a table, a feature is a column on that table. Qualitative data is data that can only be a finite set of values. (An example of this would be class specification, whether a student is a freshman, sophomore and so on.) Quantitative data is strictly numerical based. (An example of this could be test scores or GPAs.)

(f) Machine learning feels like the gateway to the future of computation, and keeping that in mind really allows my creativity to soar in finding problems that a potential personal project can solve. Machine learning allows me to find something within a super personal niche and create something that I will love contributing to for what I hope to be years. As an example, one of my new hobbies I've taken up recently thanks to some of my friends has been playing fighting games. To those who aren't very familiar with fighting games, they tend to be difficult and fast paced games that rely on specific inputs at tight, specific timings. I would love to construct a machine learning model that can read a game state and attempt to figure out an optimal action based on professional fighting game footage to create a personal, competent fighting game

player. I think expanding on deep learning topics and artificial neural networks will be critical in a project like this, and frankly, I cannot wait until I cultivate some more skills so that I can properly give some personal projects like this a go!