Student 12: Struggling with Concepts

Question 1: Explain the differences between supervised, unsupervised, and reinforcement learning in machine learning. Provide examples of applications for each approach.

Answer:

Machine learning has different types. Supervised learning is when you teach the computer with examples that have the right answers. Like showing it pictures of animals and telling it what animal it is.
Unsupervised learning is when the computer learns by itself without being told the answers. It tries to find patterns in the data.
Reinforcement learning is when the computer learns by trying things and getting rewards or punishments. Like training a pet.
Examples are spam detection for supervised, grouping customers for unsupervised, and playing games for reinforcement.

Question 2: Describe the architecture and functioning of Convolutional Neural Networks (CNNs) and explain why they are particularly effective for image recognition tasks.

Answer:

CNNs are neural networks for images. They have special layers that look at parts of the image. They can find edges and shapes and then put them together to recognize objects.
They work better than regular neural networks for images because they understand that nearby pixels in an image are related to each other.
CNNs are used for face recognition and finding objects in pictures.

Question 3: Discuss the ethical considerations and potential societal impacts of implementing artificial intelligence systems in critical decision-making processes.

Answer:

AI can cause problems when making important decisions. Sometimes AI is unfair to certain groups of people because it learned from bad data. This is called bias.AI decisions are hard to understand because they're like black boxes. This is bad when we need to know why a decision was made.
AI uses lots of personal information which can be a privacy problem. People might not want their data used.
AI might take away jobs from people which could cause unemployment.
When AI makes mistakes, we don't know who to blame.

Question 4: Explain the concept of transfer learning in deep neural networks and discuss its advantages and limitations.

Answer:

Transfer learning is using a model that was trained before for a new job. Instead of starting over, you use what it already learned.
Good things:
Faster
Needs less data
Works better
Bad things:
Only works if tasks are similar
Might have problems

Question 5: Describe the principles of natural language processing (NLP) and how transformer-based models like BERT have revolutionized language understanding tasks.

Answer:

NLP is making computers understand human language. It's hard because language is complicated.
BERT is a new type of model that's better at understanding language. It looks at words in both directions instead of just one way. This helps it understand context better.BERT is trained on lots of text and then can be used for different language tasks like
answering questions or understanding emotions in text.