Assignment Nine: Types of Learning

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**Types of Learning**

1. **Supervised Learning:**
   1. In supervised learning, an agent is provided with input-output pairs and learns a function that maps from input to output. The agent learns by observing examples where each input has a corresponding label or output. For example, given images as inputs labeled as “bus” or “pedestrian,” the agent learns a function to predict these labels when presented with new images. Supervised learning can be thought of as learning with a teacher, where feedback is provided based on the accuracy of the predictions made. (Artificial Intellligence: A Modern Approach, 2021, pp. 651-655)
      1. Credit Scoring – Financial institutions can use supervised learning to assess the creditworthiness of individuals applying for loans. By training models on historical data of borrowers (including features like income, credit history, and repayment records), the system can predict the likelihood that a new applicant will repay a loan on time.
2. **Unsupervised Learning:**
   1. In unsupervised learning, the agent receives data without any explicit labels or output values. The task is to discover hidden patterns, structures, or clusters in the input data. For example, when presented with a large set of images, the model might identify groups of similar images without being told what those groups represent. (Artificial Intellligence: A Modern Approach, 2021, pp. 651-655)
      1. Network Security Detection – Unsupervised learning can identify unusual patterns or behaviors in network traffic that may indicate potential security threats or breaches. By clustering normal activity patterns, the model can detect deviations that may signal an attack or unauthorized access.
3. **Reinforcement Learning:**
   1. Reinforcement learning involves an agent learning from interactions with an environment by receiving feedback in the form of rewards or penalties. The agent takes actions in the environment and learns from the consequences of those actions, aiming to maximize cumulative rewards over time. For example, in a chess game, the agent receives a reward if it wins and a penalty if it loses. It must figure out which moves lead to the best outcomes based on this feedback. (Artificial Intellligence: A Modern Approach, 2021, pp. 651-655)
      1. Traffic Signal Control – Reinforcement learning can be used to optimize traffic light timings in urban areas. The system learns to adjust signal timings based on traffic flow data to reduce congestion and minimize waiting times, thereby improving the overall efficiency of traffic management.

# References

Artificial Intellligence: A Modern Approach. (2021). In S. Russell, & P. Norvig. Hoboken, NJ: Pearson.