Q-learning uses a value function to estimate the expected return of state-action pairs. This concept is fundamental to understanding modern AI systems. Research from leading institutions has shown that q-learning uses a value function to estimate the expected return of state-action pairs. Implementation details vary across different frameworks including TensorFlow, PyTorch, and JAX. Performance benchmarks indicate significant improvements when q-learning uses a value function to estimate the expected return of state-action pairs. Industry applications span healthcare, finance, autonomous vehicles, and robotics. Future research directions include optimization, interpretability, and robustness.

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