Overview of Project

Implementation of Deep Reinforcement Learning Algorithm for Optical Transport Network (OTN) Reconfiguration

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Problem Statement

The problem is: Optimizing OTN network resource utilization while minimizing both the number of disruptions and the disruption period during network reconfiguration.

Reconfiguration involves changing the configuration (topology) according to traffic demands, failures, etc., and has two parts:

1) Computing optimized routes for existing connections (sub-optimum to optimum paths).
2) Migration - the focus is solely on this phase, which involves moving connections from current sub-optimum paths to new optimum ones.

During migration, the new optimum path may fail to establish due to a lack of resources. This forces some connections to be temporarily terminated and re-established later, causing **disruptions.**

Proposed Solution Method

Our goal is: Developing an efficient RL method for OTN network reconfiguration that minimizes the disruption period and the number of disruptions, and the proposed solution method is **Double DQN**, which is powerful for discrete action spaces such as in this problem.

The Q-value function in DQN helps evaluate how good an action is in a specific situation by predicting the total future rewards. This enables the learning of migration strategies over multiple training episodes to reduce the number of disruptions.

Double DQN reduces errors in estimating action values by separating the action selection and action evaluation processes. This improves decision-making, leading to more accurate and stable learning over episodes.

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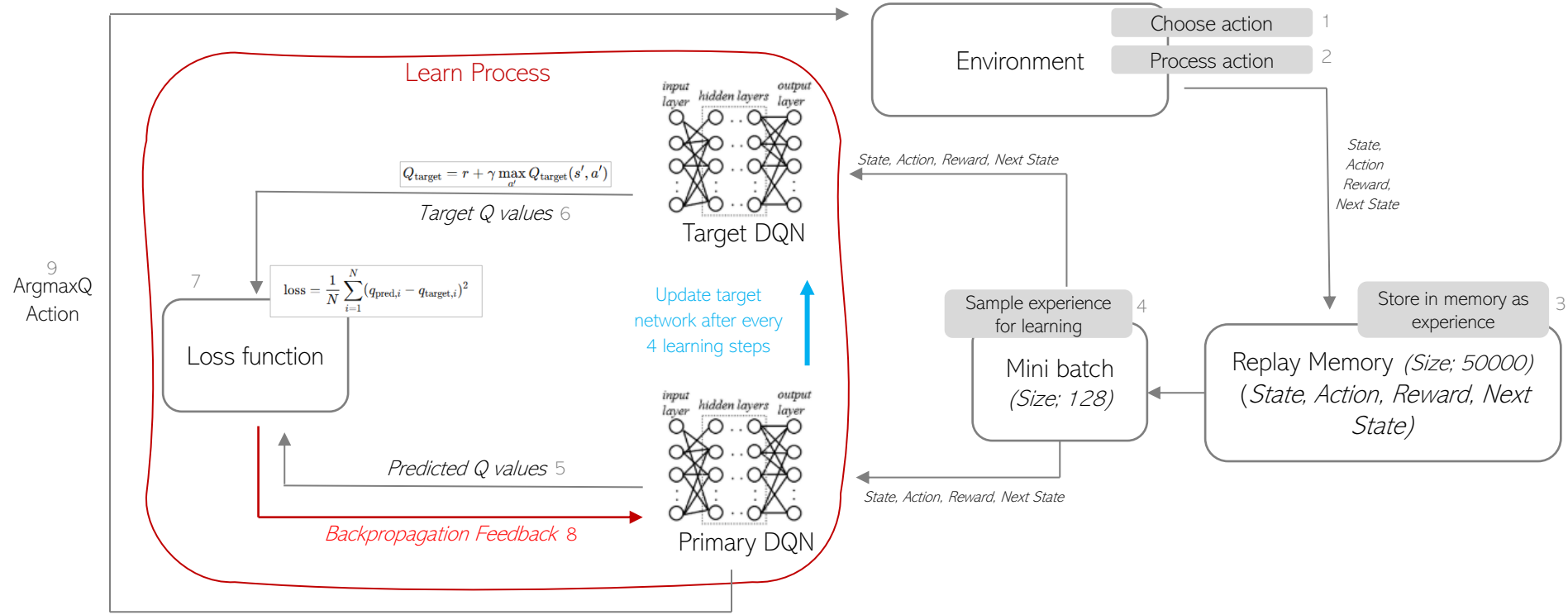

Figure: Double DQN workflow for OTN reconfiguration