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CLD771 Minor Project - Final Report Using Deep Reinforcement Learning for scheduling gasoline blending and distribution (SGBD)

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**1. Abstract** We aim to solve the problem of scheduling gasoline blending and distribution, and by extension, general production scheduling. We make a model environment to simulate the insides of a chemical plant, and train on it using different algorithms to compare which gives us the best results and analyze those results.

**2. Introduction**

**2.1 Reinforcement Learning** Reinforcement Learning (RL) deals with the task of teaching agents what actions to take given a certain environment/state. These actions bring about change in the environments with the goal of receiving a reward. When the agent is a neural network, the field is said to be Deep Reinforcement Learning (DRL).

**A universal model of reinforcement learning**

```
graph LR; Agent[Agent  
Human  
or Robot] -- behavior --> Environment[Environment]; Environment -- state changes --> Agent; Environment -- reward/punishment --> Agent;
```

Data source: res.mdpi.com—Deep Reinforcement Learning for the Control of Robotic Manipulation: A Focused Mini-Review

Figure 1: A universal model of reinforcement learning

These environments need to be modelled according to and is specific to whatever process we are trying to learn/simulate. The environments contain all rules related to how the action effects the environment, the completion/success of the process and any reward. They need to contain all balances e.g. mass balances, material balances, energy balances, etc. Modelling them precisely and correctly thus becomes essential for ensuring that we are learning what we intend to.

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