

5G Smart Networks: Network Slicing

What is machine learning (ML)?

computer algorithms that **automatically learn** and **improve** by analysing data

Reinforcement learning:

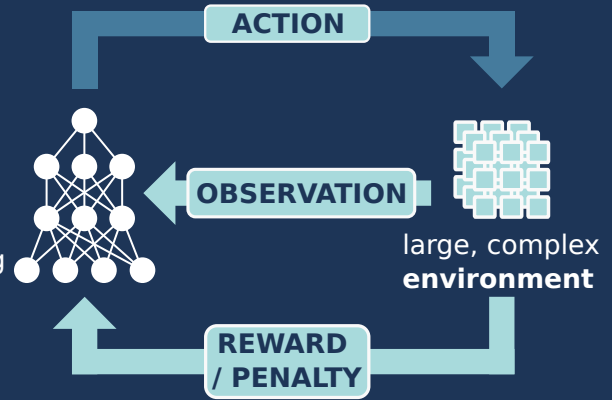
The agent (a decision-making programme) learns and improves through trial and error.



The environment gives feedback (via rewards / penalties) - agent tries to maximise rewards.

Deep reinforcement learning (DRL):

Agent:
many
connected
layers of
processing



DRL agent processes complex data in layers to decide an action, then learns from feedback.

How will ML techniques help with network slicing?

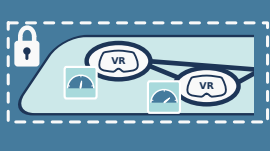
1. Network: **complex** & constantly **changing**

Predict how resource requirements will change



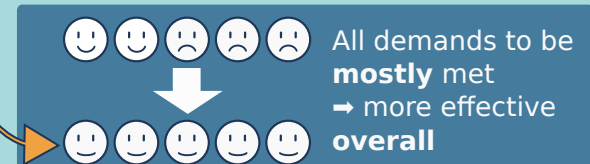
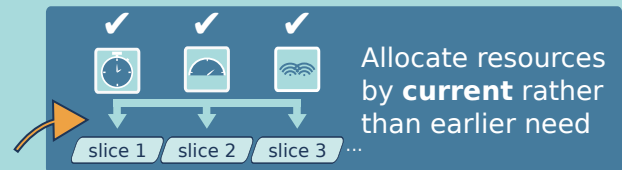
2. User data: **not available**

User data **not** needed: only **environment** data required



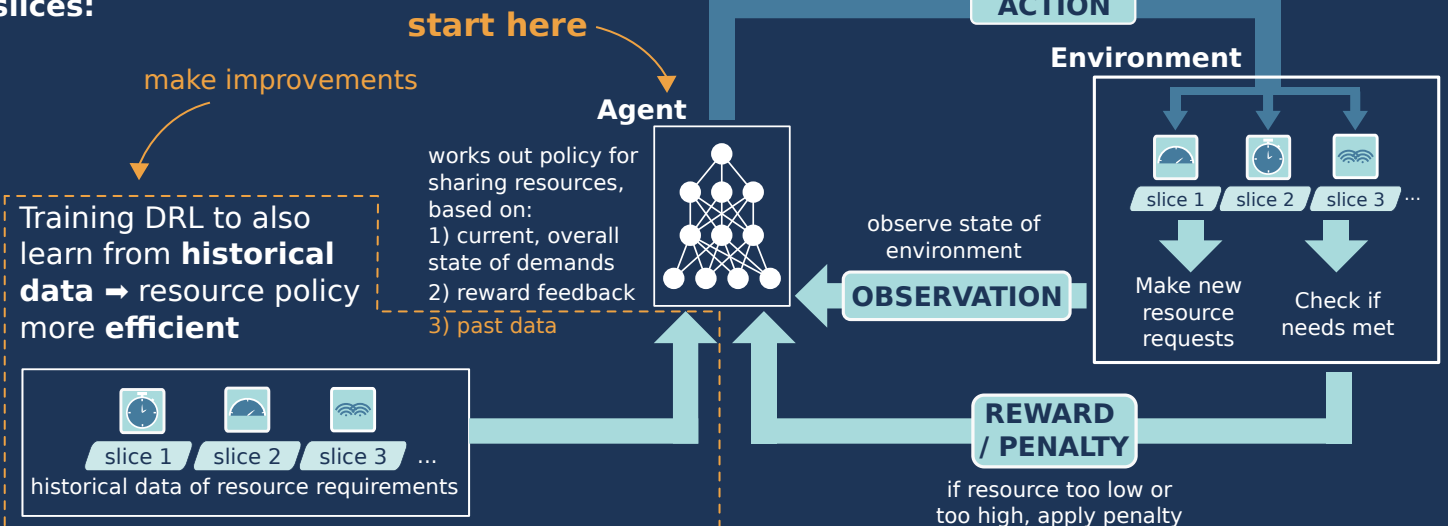
DRL: Discover patterns in complex data & learn from experience

3. Network Resources: **limited**



Using ML for network slicing: Research Results

DRL can be used to allocate resources effectively amongst slices:



DRL: allocates resources most effectively over long period in a complex, changing network