Deep-learning applications to the multi-objective optimisation of IACT array layouts

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Simplifying the problem

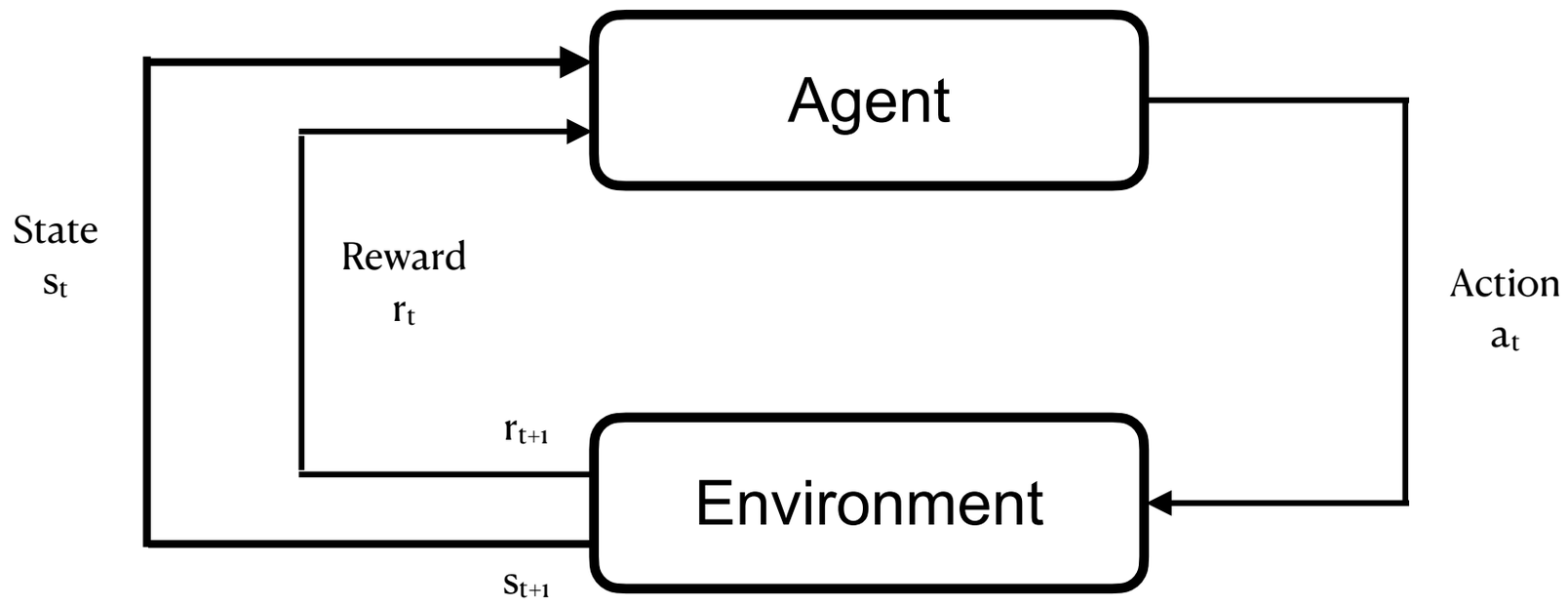
- Optimisation of IACTs usually needs detailed Monte Carlo and shower simulations to improve event detection rate and the quality of reconstruction

- Use a heuristic model for simplification

- Optimise (at first) for simple metrics using Reinforcement learning

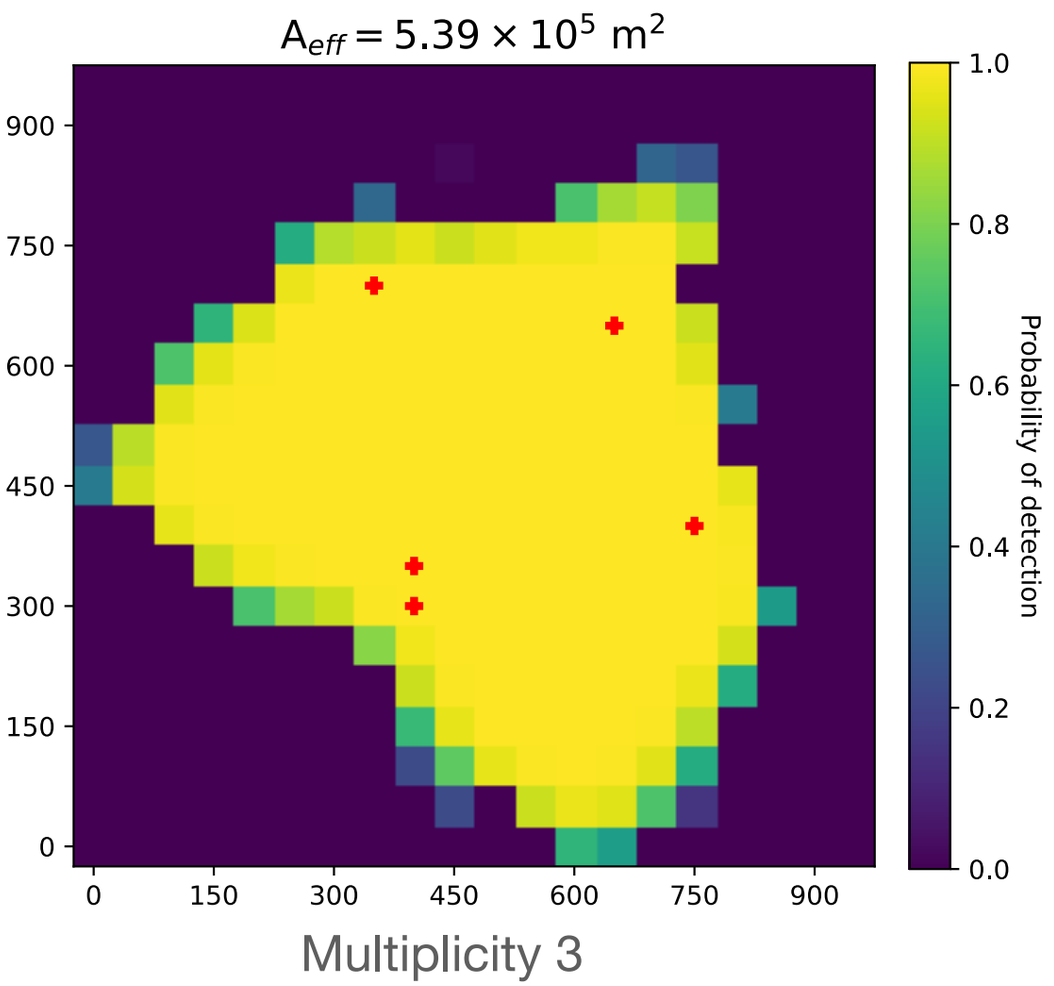
Reinforcement Learning

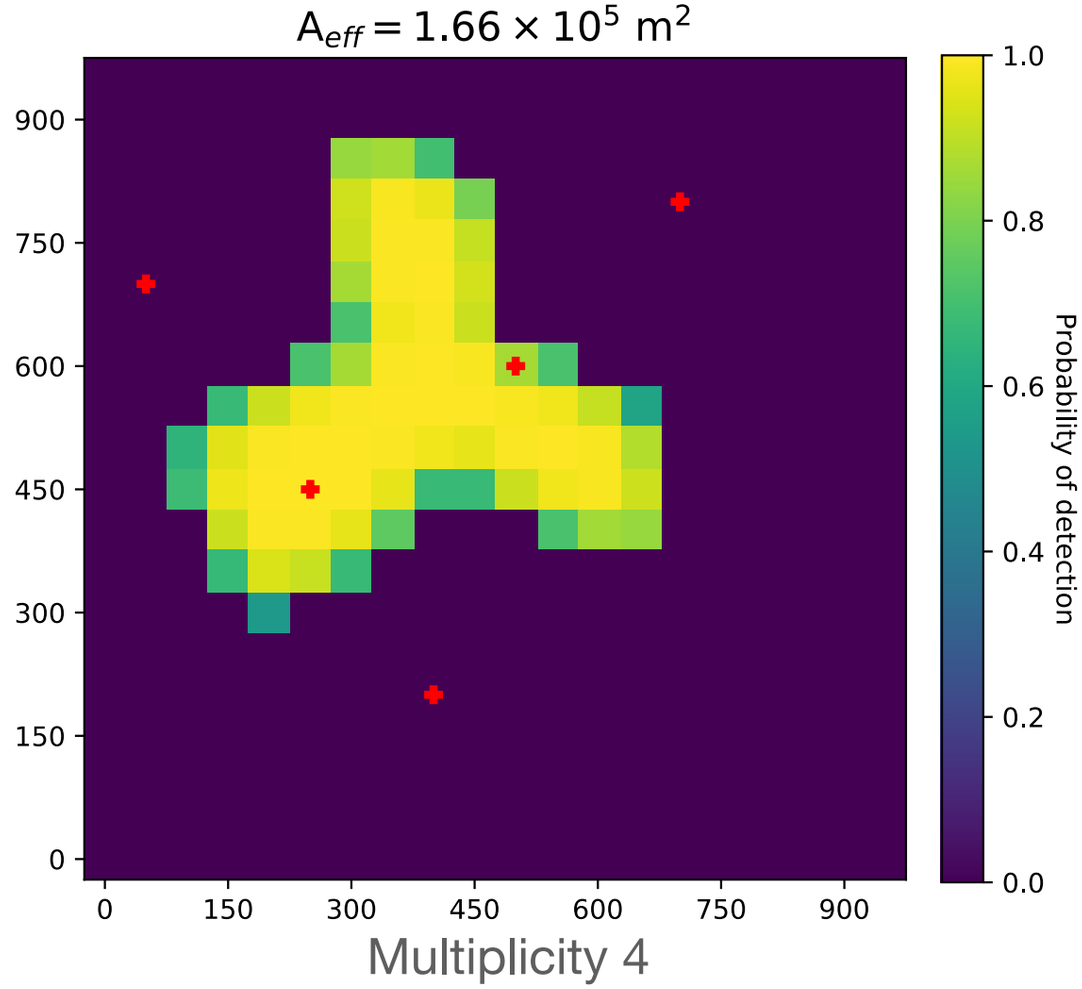
- Algorithms trained to achieve a goal/maximise rewards
- Agent performing actions on Environment -> rewards
- Agent tries to learn a policy that will maximise the sum of future rewards
- Applications in gaming, autonomous driving, robotics, healthcare, …



Results

- Environment: Square grid with 5 telescopes
- Agent moves the telescopes to different positions
- Shower of 1 TeV
- 5 telescopes with 10m diameter
- Use the effective and internal area to determine the rewards





Future Work

- Increase the number and type of telescopes
- Use more metrics
- Test different algorithms
- Use shower simulations for more detailed results