Problem Statement

Module A: Detect and localize stroke infarcts on NCCT volumes

- Slice-wise segmentation of stroke infarct.
- 2D and 3D feature fusion for context-aware segmentation.
- Rendering a 3D visualization of the stroke infarct location.
- Potentially, make quantitative measurements to aid *module B*.

Module B: Perform path-planning for robot-assistive intervention

- Assistive intervention using a 6-DOF robotic arm.
- Reinforcement learning (RL) to quickly.
- Specific focus on smooth operation in a precision setting.

Solution Architecture

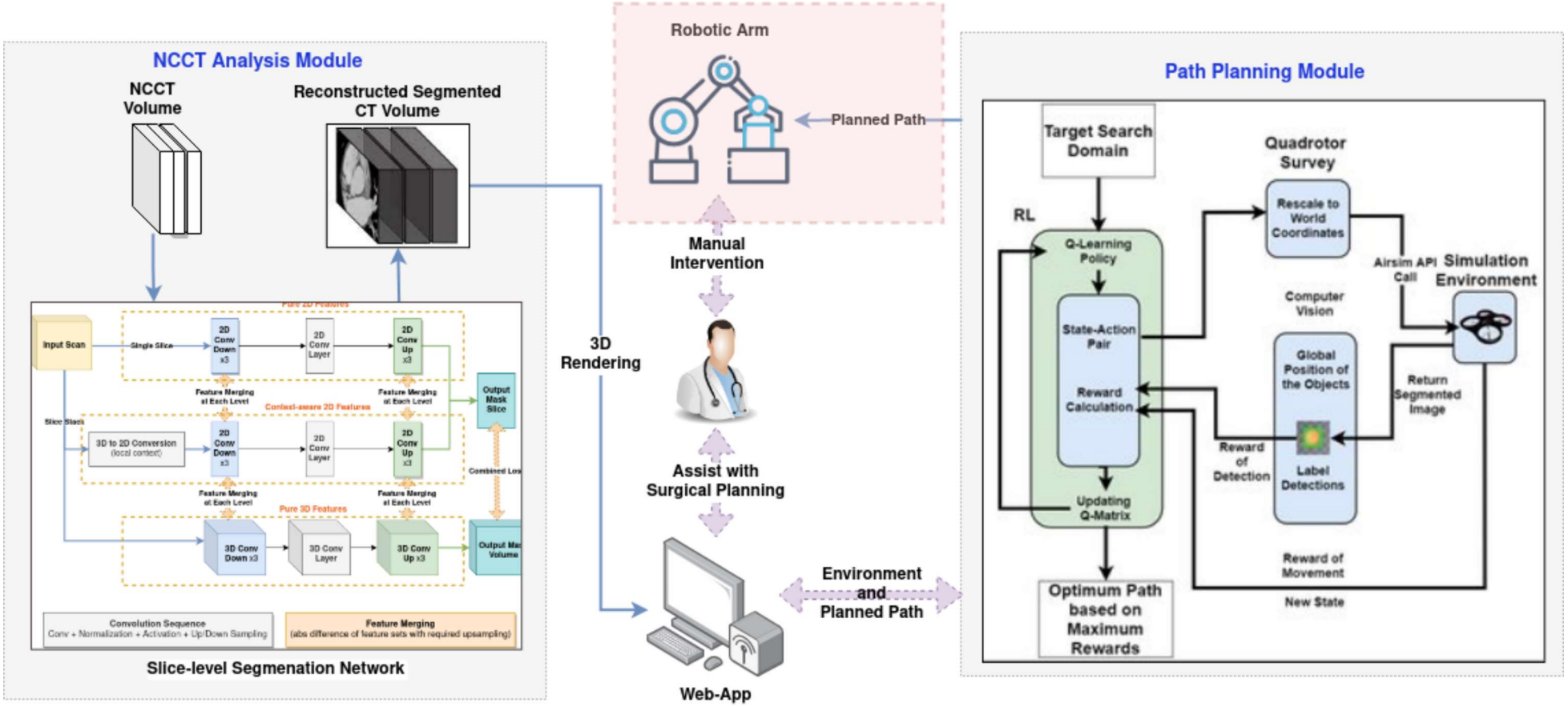


Figure: Architecture of the proposed solution.

Demo (cont.)

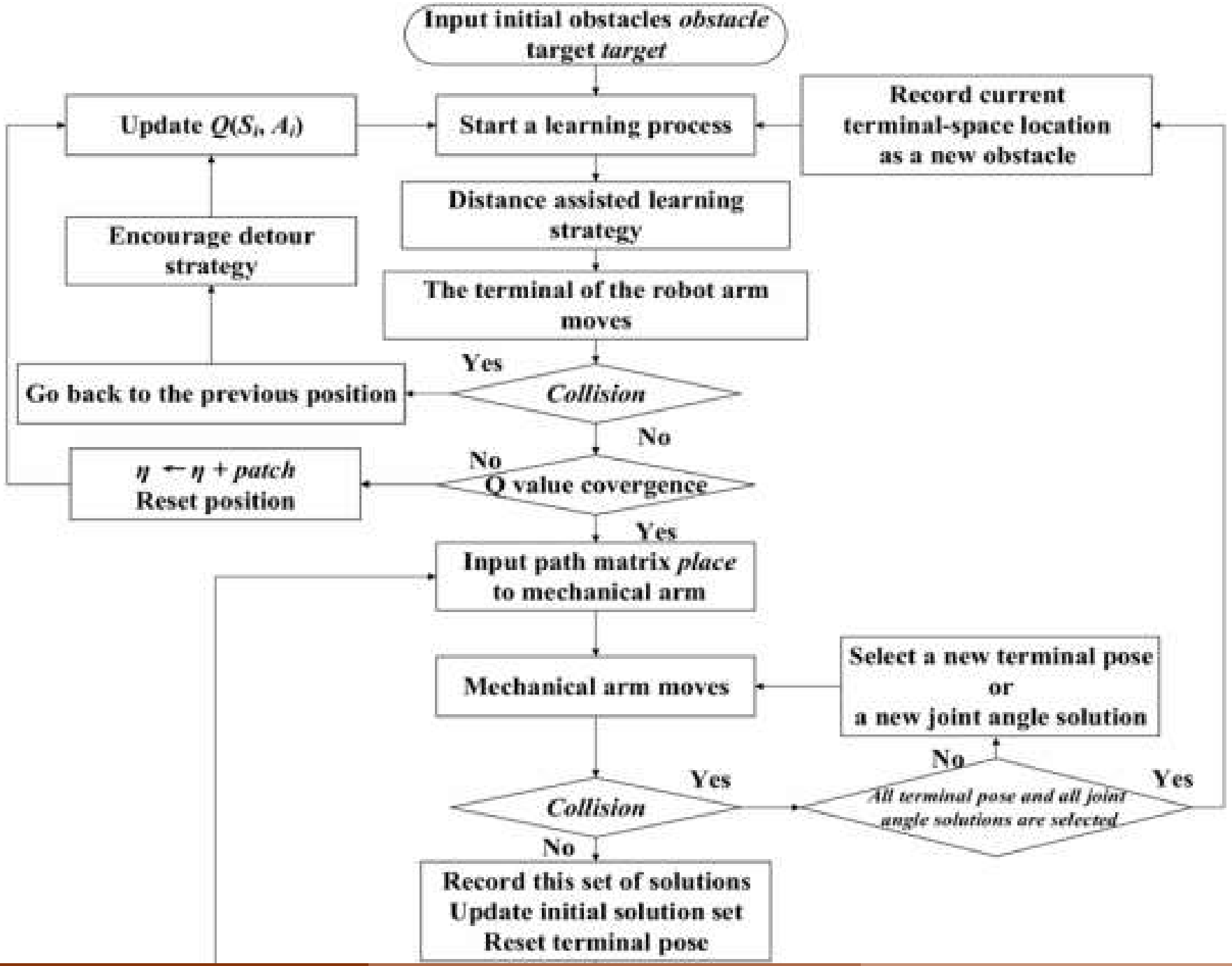
NCCT Analysis Module

- Qualitative analysis of results [Link].
- Web-app for 3D segmentation demo [Link].

Path-planning Module

- Comparison of Deep-RL and Q-Learning [Link].
- Result representation of Q-Learning [Link].
- Web-app to assist robotic surgery for neurosurgeons [Link].

Path-planning workflow



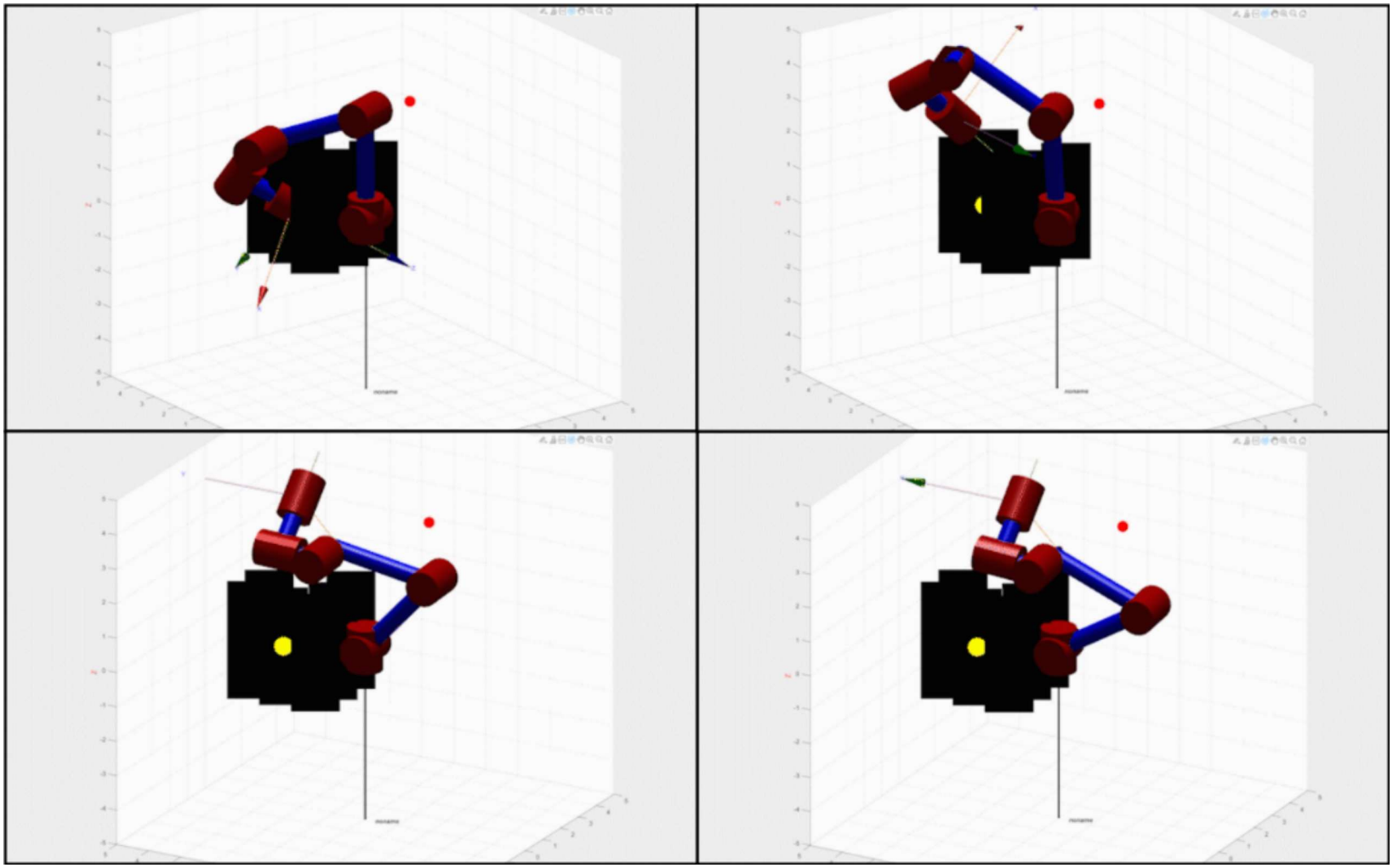
Follow-up: Review 1 Comments

Choice of design — Deep RL vs. RL

- Performed preliminary investigations to identify pros and cons.
- Discussed with mentor and domain experts.
- Decided to pursue an RL-based solution.

Key Contributions

- Modified distance function for the reward function: combination of chebyshev and parameterized minkowski distance.
- Simulated annealing method to control extent of exploration.
- Improved performance than existing Q-learning approaches.



Demo

NCCT Analysis Module

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