Adding RL: An extension to Robustness in Diversity: Quality-Diversity Driven Discovery of Agile Soft Robotic Gaits

An Annotated Bibliography

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References

[1] D. T. J.-B. M. Antoine Cully, Jeff Clune, "Robots that can adapt like animals," *Nature*, 2015.

In this paper, Cully and colleagues introduced the Intelligent Trial Error algorithm, where a robot first builds a large MAP-Elites archive of diverse, high-performing gaits and then uses Bayesian optimization to quickly select a compensatory behavior when damaged. In my case, this inspires me to treat the gait repertoire I evolved through QDAs as a behavioral memory and layer a reinforcement-learning meta-controller on top. Instead of Bayesian search, I could train an RL agent to recognize environmental cues—such as terrain slope, roughness, or friction—and select the most appropriate gait from the archive. This would allow the robot in my system to adapt online, using learned policy decisions rather than manual transfer testing.