UT Austin Villa: Optimizing Robot Body Morphologies for Maximizing Performance and Potential in Running and Kicking Tasks

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Description

A key advantage of working with robots in simulation over working with robots in the physical world is the ability to quickly prototype and try out new robot models. For this work we use use machine learning techniques to optimize robot body morphologies for two important tasks of playing soccer: running and kicking. While it might be easy to gain performance in both running and kicking by increasing the power and mass of a robot, we restrict our body changes to that of changing the anchor points of the robot's joints. In doing so we hope to find ways of redesigning robots efficiently to maximize the potential of their current materials and motors.

While only optimizing six anchor joint positions in the standard type 0 Nao robot model, we are still able to significantly improve its performance on the tasks of running and kicking to levels of performance never seen before in the Simspark simulator. This includes a robot model that can run across the length of the field in 10 seconds, and a robot that can kick the ball almost the entire length of the field.

Presentation

The presentation will include a few slides on how we optimize robot body models for the tasks of running and kicking. The presentation will conclude with videos and/or live demonstrations of optimized robot models running and kicking.