Learning to acquire whole-body humanoid CoM movements to achieve dynamic tasks with a policy gradient method

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Abstract: We present an approach to acquire dynamic whole-body movements on humanoid robots focusing on learning a control policy for the Center of Mass. A policy gradient method is used to acquire a CoM movement as a control policy for achieving a desired dynamic task. A CoM-Jacobian-based redundancy resolution is then used to compute angular velocities for all joints in order to achieve a whole-body movement consistent with the acquired CoM movement through learning. To demonstrate the effectiveness of our method, we apply it in simulation to the learning of a strong punching movement on the Fujitsu humanoid robot Hoap-2. Moreover, we present the performance of the learned controller with real hardware robot as well.