Título: **Gradient-based steering for vision-based crowd simulation algorithms**

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Resumo: Most recent crowd simulation algorithms equip agents with a synthetic vision component for steering. They offer promising perspectives by more realistically imitating the way humans navigate according to what they perceive of their environment. In this thesis, it is proposed a new perception/motion loop to steer agents along collision free trajectories that significantly improves the quality of vision-based crowd simulators. In contrast with previous solutions - which make agents avoid collisions in a purely reactive way - it is suggested exploring the full range of possible adaptations and to retain the locally optimal one. To this end, it is introduced a cost function, based on perceptual variables, which estimates an agent's situation considering both the risks of future collision and a desired destination. It is then computed the partial derivatives of that function with respect to all possible motion adaptations. The agent adapts its motion to follow the steepest gradient. This thesis has thus two main contributions: the definition of a general purpose control scheme for steering synthetic vision-based agents; and the proposition of cost functions for evaluating the dangerousness of the current situation. Improvements are demonstrated in several cases.

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