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MPACT: Mesoscopic profiling and abstraction of crowd trajectories

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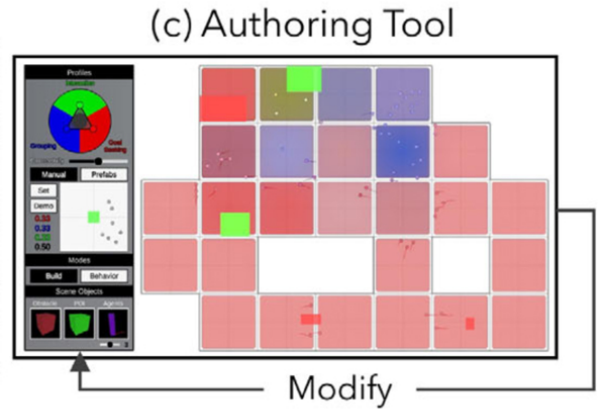

Simulating believable crowds for applications like movies or games is challenging due to the many components that comprise a realistic outcome. Users typically need to manually tune a large number of simulation parameters until they reach the desired results. We introduce MPACT, a framework that leverages image-based encoding to convert unlabelled crowd data into meaningful and controllable parameters for crowd generation. In essence, we train a parameter prediction network on a diverse set of synthetic data, which includes pairs of images and corresponding crowd profiles. The learned parameter space enables: (a) implicit crowd authoring and control, allowing users to define desired crowd scenarios using real-world trajectory data, and (b) crowd analysis, facilitating the identification of crowd behaviours in the input and the classification of unseen scenarios through operations within the latent space. We quantitatively and qualitatively evaluate our framework, comparing it against real-world data and selected baselines, while also conducting user studies with expert and novice users. Our experiments show that the generated crowds score high in terms of simulation believability, plausibility and crowd behaviour faithfulness.

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