

A system for crowdsourcing on-demand quantitative design space exploration in 3dspace

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Abstract. Crowdsourcing feedback on proposed designs is an effective means of gaining insight and acceptance of a proposed design. Recently web based 3d visualisation systems (Dobos 2012; Bugs et al 2010; Wu et al 2015) have enabled crowdsourcing of design feedback on a larger scale. However such systems rarely present more than one design alternative in a limited design space and seldom provide quantitative analysis on proposed design scenarios. This precludes a more participatory approach (Bornig et al 2004) including a wider audience and their insight in the design process. We propose a system to assist the design team by augmenting a 3d visualisation crowdsourcing environment with quantitative on-demand assessment of design variants run in the cloud. This enables crowdsourced exploration of the design space. Automated participant tracking and submitted feedback on effective design options are collated to aid the design team in balancing the demands of urban master planning.

1. Introduction

Urban master planning is a balancing act between a number of inter-related design parameters that are explicit and quantitatively measurable, a number of other aspects that are implicit, not easily measurable, and are dynamically driven by human preference and market forces. Optimization alone won't help find the most appropriate solutions. Hence we propose crowdsourcing augmented with a quantified design analysis to explore these aspects and guide us to a set of the most synergetic solutions.

The design process involves experts from many disciplines making a plethora of decisions which will affect the urban environment and those who live and work within it. The design space has a very large scope including not only choice of architectural forms but also a huge number of design decisions which must be made to implement the vision of the development. These range from the number of parking spaces to the amount of green space included.

Aside from such design decisions the threat of climate change imparts a requirement to minimize the carbon emissions of a development by the adoption of mitigation strategies. Such strategies have impact across multiple disciplines and Key Performance Indicators (KPI's) and requires multidisciplinary collaborative exploration to enable their implementation. Such strategies are, of course, constrained by cost both capital and operating costs as well as impacts upon other resources such as water or energy consumption, creating a challenging optimization problem, particularly as many of the constraints are either undefined or cross traditional discipline boundaries. Such optimization of the design for an urban masterplan is rarely conducted within detailed quantified assessment nor is that assessment repeated more than a couple of design cycles (Flager and Heymaker 2007) nor does it often involve the key group of stakeholders – the people who will live and work in such an environment.

In this context crowdsourcing of design feedback enables wider participation in the design process. This is particularly effective if conducted early in the design process through participatory design. In recent years online web based tools (Dobos 2012; Salim 2015; Corney 2010) are enabling residents and members of the public to submit their feedback on design