

# Quantitative Analysis of Emergent Narrative for Authors<sup>\*</sup>

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When analyzing interactive narrative works made using a particular authoring tool, one of the most common approaches is to evaluate either the quality of the work itself, or the efficiency and ease of use of the tool for creating the work. The approach, however is particularly difficult, or even impossible, in the case of *emergent narratives*, whose very complexity and depth seem to resist both a simple form of authorship and evaluation. Emergent narrative systems often rely on a significant amount of content authoring, in which each addition to the system may dramatically alter the types of narratives that could possibly emerge during any given run of the work. Even a relatively simple emergent narrative may enable a significant number of *possible narratives*, thus reducing the value of a qualitative analysis of one or more particular narratives as a means of understanding the system itself. While authors have argued that re-tellings [2], or playthroughs [1], are a valid tool for evaluating the success of emergent narrative works, such an analysis requires a complete emergent narrative work to be of value. During the process of authorship, when the authoring tool will be of use, qualitative analysis will be unable to provide a complete understanding of the capability of the system outside its current state, as any modification, addition and removal of the content in the system will dramatically change the possible narratives the system is able to create. This understanding is arguably of importance in an authoring tool, which aims to take the complexity of authoring a specific type of content and represent it in a way that it is easily understood, and further allows the author to work towards one or more specific intents. What is needed then, are analysis tools which are able to evaluate quantitative properties of the *narrative space* [4], ie. the space of all possible narratives which is created through the interactions of rules and content of the simulation.

Given the sheer complexity of an emergent narrative work, simply understanding all possible outputs of the system will yield little results. Instead, the narrative space can be evaluated in terms of the presence and structure of certain *qualities*. In the procedural generation community, these qualities are often measured using a form of *expressive range analysis*, in which a number of generated pieces of content are evaluated according to a numerical set of qualities, allowing a means to compare the output of a certain generator in relation to the modification of certain parameters, and their effect on the qualities of the generated content [7].

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An example of quantitative analysis being used in conjunction with authoring tools may be seen in Garbe et. al’s authorship system for *Ice-bound* [3], which identified areas of the narrative system which lacked significant textual content, and Szilas et. al’s system for detecting the presence of conflicting goals in a given narrative model [8]. In my own work, I have experimented with a form of expressive range analysis [5] which is focused upon evaluating the narrative space in terms of the formal models of *conflict* [9], and *tension* [8]. Essentially, we work under the assumption that the presence, instigation, and resolution of conflict are critical to designing an emergent storytelling system, and therefore the system’s ability as an interactive narrative work may be analyzed according to its ability to generate certain patterns and structures of conflict. With this approach, we have demonstrated how certain authorial goals can be evaluated within the analysis tools, and further how this analysis can be used for content authoring itself (ie. generating content to fit a certain structure of conflict) [6]. The value of using quantitative evaluation hinges upon having formal narrative properties which can be quantitatively detected within a work, and that also represent a quality which is considered desirable by the author within the narrative space.

In opposition to qualitative narrative evaluations, quantitative analysis allows authors to perform *benchmarks*, *comparisons*, *verification*, and *classifications*. Benchmarks, are the the ability to quantify certain qualities within the authored work. Comparisons allow us to compare the benchmarks between versions of the emergent narrative. Verification, allows for the ability to prove that certain benchmarks are met by a given version of the emergent narrative. Lastly, classifications allow for the detection of recurring structures and patterns of a certain quality within an emergent narrative work. This enables an incremental form of authorship, in which the benchmarks of certain emergent narrative versions may be compared, and guided towards certain goals which can then be verified. Classifications, can be used to position the emergent narrative within certain genres, or detect the way different tropes or structures are present within the work.

While a quantitative evaluation does not directly represent the quality of either the emergent narrative work or a specific narrative instance, it nonetheless provides fast, quick feedback that can easily be acted upon by the author of a given work. Such an analysis tool can be considered as component of a larger narrative authorship tool, one which is not in itself an authoring tool, but can provide a significant service to authors. In this way, quantitative analysis tools can be considered an valuable addition to authoring tools for complex narrative models.

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