

# Using Social Relationships to Control Narrative Generation

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## Abstract

Narrative generation represents an application domain for AI planning where plan quality is related to properties such as shape of plan trajectory. In our work we have developed a plan-based approach to narrative generation that uses character relationships as a key determinant in controlling plan shape (relationships are key in genres such as serial dramas and soaps). Our approach is implemented in a demonstration Interactive Narrative, called NETWORKING, set in the medical drama genre. The system features a user-friendly mechanism for specifying relationships between virtual characters, via a social network and real-time visualisation of generated narratives on a 3D stage.

## Introduction

Narrative generation for Interactive Storytelling (IS) is an emerging application area for AI planning, with most approaches being plan-based since initially proposed by Young (2000). However, narrative domains differ from other benchmarks since the criteria used to assess plan quality tends to relate to aspects such as plan trajectory shape and the ability to generate diverse sets of narratives, rather than optimality.

We observed that in some narrative genres, e.g. serial dramas and soap operas, social relationships and conflict play an important role, as does repetition of elementary narrative elements, yet diversity is achieved via constantly changing relationships between characters and the situations that naturally arise out of this. We explored a similar mechanism in narrative generation and have developed an approach which enables social relationships to be used as the key determinants of narrative shape and diversity.

Our approach is implemented in the NETWORKING system (**Network** for **I**nteractive **N**arrative **G**eneration), an Interactive Narrative set in the medical drama domain. The system features a visual interface—a social network—which enables the setting of relationships between virtual characters, generation of narratives based on the specification and narrative visualisation in real-time on a 3D stage. Our social network interface represents a novel mechanism for interaction in narrative but one that, given the ubiquity of social networks, we anticipate users will find engaging.

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## Technical Overview

Our approach uses social relationships for declarative control during generation as detailed below and shown in Fig 1:

### Specification of Social Network

To facilitate the use of social networks for declarative specification in narrative generation a classification of relationships was developed that balanced usability (usable number of relationship types) with an acceptable degree of narrative change (in terms of inter-narrative distance resulting from relationship change). The resulting classification had 12 categories, including *professional-rival* and *secretly-dating*.

### Narrative Generation

Narrative generation uses a plan-based decomposition approach where narrative situations are used as pseudo-landmarks to control generation (Porteous, Charles, and Cavazza 2013). The key function of social relationships between virtual characters specified in the social network is to determine action relevance during narrative generation. For example, if characters have positive relationships, such as *friend* then they are more likely to support, discuss and arbitrate, whereas characters with negative relationships are more likely to confront and argue (as illustrated in Fig. 1 which contrasts the action *spread-malicious-gossip*, selected when the characters' relationship is *extreme-antagonist*, with *show-appreciation-treatment-advice*, selected when they are *friend*). An additional function of social relationships is to change the possibility of different situations occurring in the narrative due to the propagation of the effects of selected actions.

The domain model is composed of narrative actions that characterize the genre (e.g. conflicts over diagnosis, treatment, professional rivalries, romance). Similarly, narrative goals are characteristic of the genre, relating to resolution of situations arising out of themes such as pressures of work and medical conflicts. In total, the NETWORKING domain model has a cast of 10 doctors, 5 nurses, 3 patients and close to 100 narrative actions (approx. 25,000 ground instances).

### Narrative Diversity

Results of experiments reported in (Porteous, Charles, and Cavazza 2013), obtained across hundreds of runs of the system measured in terms of real-time performance and story

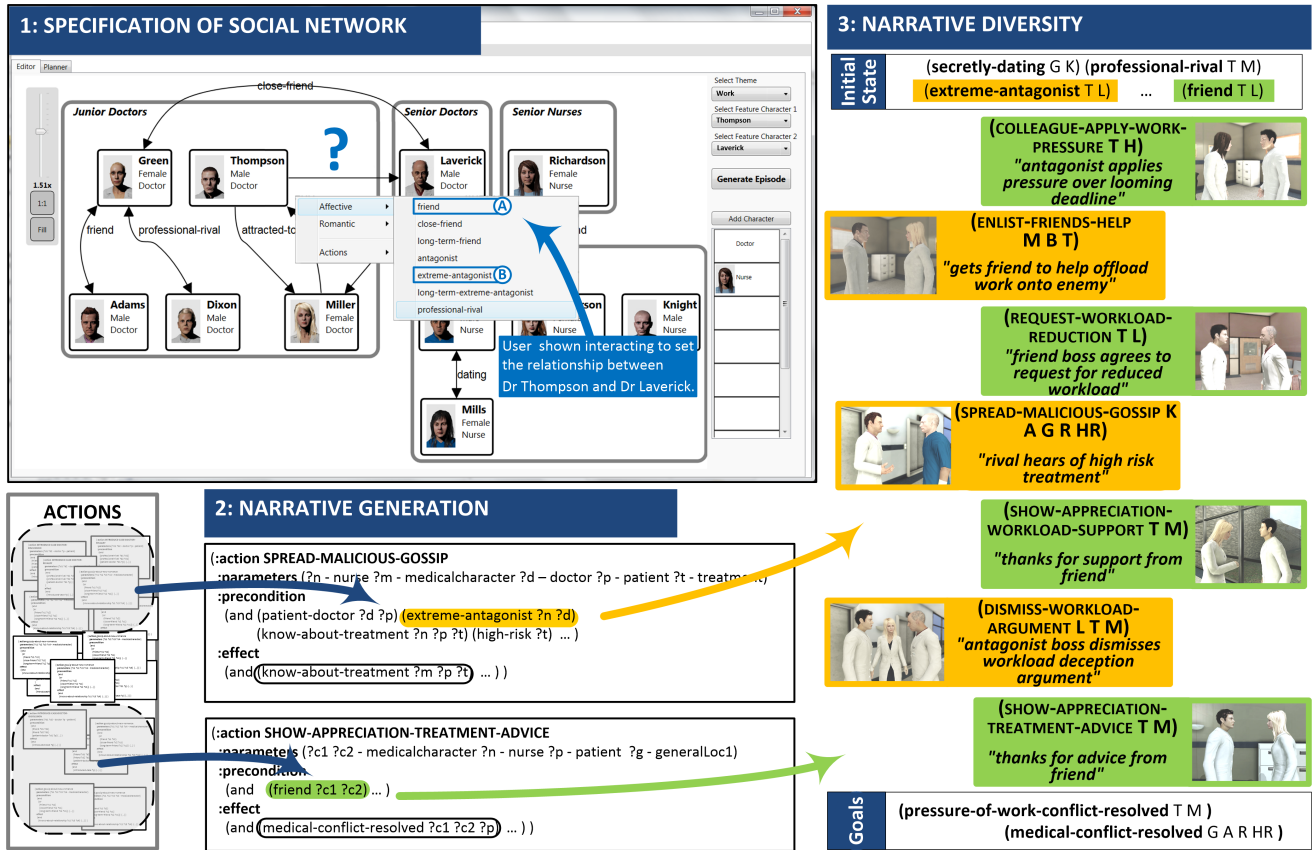


Figure 1: NETWORKING System Architecture Overview: (1) Visual interface for declarative specification of social relationships which are used as determinants for narrative generation; (2) Social relationships determine action relevance during planning and impact on narrative situations; (3) Differences in relationships can result in large inter-narrative distance.

diversity, demonstrate the potential for the approach to yield large differences between generated stories via moderate changes to the social network.

### Interface for Declarative Planning Control

The social network interface provides a mechanism for authoring interactive narratives and visual exploration of the impact of social network changes on narrative diversity:

**Authoring via visual Interface:** the interface is used to specify social relationships, select feature characters and a goal theme. When a narrative is generated, this specification forms the basis of the initial state of the narrative world, is used to select appropriate narrative goals and constraints (landmarks) to control the shape of the narrative (e.g. Fig. 1(1) shows selection of the “work” theme, and specification of the relationship between Thompson and Laverick).

**Visual Exploration of Narrative Diversity:** Social relationships govern action relevance during planning and ensure appropriate content in generated narratives. Narrative diversity was demonstrated via experiments reported in (Porteous, Charles, and Cavazza 2013) that show large inter-narrative distance (measured using Levenshtein distance)

with only moderate network changes: for 90% of narratives, a threshold of 60% difference between narratives was reached as a result of no more than 4 relationship changes.

The interface enables exploration of these different narratives when they are visualised on a 3D stage. For example, Fig. 1(3) shows screen-shots taken from the visualisations of very different narratives when Dr. Laverick and Thompson are: extreme antagonists (includes spreading of malicious gossip, down left side); or friends (includes supportive actions such as appreciation for advice, down right side).

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