A Computational Model of Narrative Conflict

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ABSTRACT

Conflict is a key feature of interesting stories. Building on previous narrative systems, I intend to formalize a computational model of conflict to inform the creation of plots which more closely match human story expectations. I have proposed a means of generating stories based on AI planning and have identified seven important dimensions of conflict: participants, subject, duration, directness, intensity, balance, and resolution. At this consortium, I hope to receive feedback on the model, along with suggestions for its use in an empirical evaluation.

Categories and Subject Descriptors

I.2.4 [**Artificial Intelligence**]: Knowledge Representation Formalisms and Methods

General Terms

Algorithms, Design, Theory

Keywords

Conflict, Narrative, Planning

1. INTRODUCTION

Narrative oriented virtual environments contain characters and objects which play out in a story directed toward author and user goals. The effectiveness of these environments hinges on their ability to construct an interactive experience consistent with the rules and expectations of our innate sense of narrative.

Early work in computer story generation focused on essential properties like logical consistency and character intentionality, without which a story does not make sense. Using this work as a foundation, we can focus on producing stories which are structured to meet the narrative expectations of the audience.

Narratologists [3, 5, 13] and researchers in computer story generation [16, 14] agree that conflict is an essential property of interesting stories, even that "conflict structures narrative" [1]. My research seeks to develop a computational model of conflict for use in automatic story generation. A precise understanding of this phenomenon will further empower narrative systems to generate engaging plots [6].

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2. PREVIOUS WORK

Most narrative systems have avoided formalizing conflict by leaving the plot in human hands [9]. They included conflict by utilizing pre-constructed plot fragments that must contain it. These systems perform no explicit reasoning about this essential narrative phenomenon, and they rely on human authorship. These constraints restrict their ability to adapt.

Other systems have modeled the relationship between protagonist and antagonist as adversarial planning [15] or as an arms race scenario [20]. These approaches do not reason about the antagonist's motivation. I believe narratology will provide a better foundation for fictional story generation because it focuses more on engaging story structures than real world simulation.

Szilas [16] annotated story actions with a "conflict value" based on the degree to which a character was forced to act against its moral principles. Barber and Kudenko [2] generated stories using momentary dilemmas—user choices that affect the fortunes of characters in the world. These systems model specific subsets of conflict. It is my intention to develop a broader model to encompasses both of these and others.

3. CONFLICT IN AI PLANNING

Partial Order Causal Link (POCL) planning algorithms have proven to be popular tools for story plot generation. Their plans contain first class representations of characters, objects, and actions, along with the causal and temporal relationships between them. These are the key ingredients of a story *fabula* according to narratologists [19].

But finding a path from start state to end state is insufficient; characters must be seen to act intentionally—that is, their actions must be directed toward their individual goals. The IPOCL planner [12] proposed a solution to this problem by including in its plans *intention frames* which describe why the characters choose to act as they do. A step taken in pursuit of a goal is a member of that goal's intention frame. This work also identified the next major step to be taken: the ability to allow conflicting plans to arise, as they inevitably do in narrative.

3.1 Enabling Conflict: Hypothetical Actions

The machinery used in POCL planners to detect logical inconsistencies prevents conflict from arising—if an action by the hero makes a fact true and an action by villain makes it false, the story will be in an impossible state. Such a plan will not be considered, though it might be the basis of a valid narrative. I have proposed a solution to this problem that allows plans to include hypothetical actions[1].

A *hypothetical action* is one that a character intends to perform but cannot because its preconditions are never met. By making some actions hypothetical, a planner can construct a full story in which every character forms plans to achieve its goals, but only certain characters *actually* succeed.

In a POCL plan, a causal link joins an effect of one action (the tail) to a precondition of another (the head) in order to explain how the precondition is met. If a third step occurs between the tail and head which negates the precondition, the causal link is threatened. Traditional POCL planners seek to remove threatened causal links, but the use of hypothetical actions renders some threats no longer problematic to the soundness of the plan.

Formally, a **conflict** exists just when:

- A causal links between tail step t and head step h, which establishes condition c, is threatened by step θ (which has effect $\neg c$).
- Step h and step θ are members of different intention frames (taken in pursuit of different goals).
- Either step h or step θ (or both) is hypothetical.

Now the methods used to detect conflict in POCL plans, which were originally used to prevent it, can be adapted to recognize *narrative conflicts*. Based on definitions provided by narratologists, a narrative conflict exists when characters form plans which thwart one another [8].

3.2 Dimensions of Conflict

Conflict is a diverse phenomenon. In order to distinguish one conflict from another and to increase the expressiveness of the model, I have identified seven important dimensions of conflict to be measured and controlled. Because no definitive narratological study exists—even Aristotle neglected to describe conflict in detail [17]—I have compiled these dimensions from several different sources:

1. **Participants** - the characters intending incompatible plans.
2. **Subject** - the condition which prevents both plans from being executable.
3. **Duration** - a span of time beginning once both characters have formed their plans and ending once one plan fails.
4. **Directness** - a collective measure of many kinds of distance, such as emotional and physical distance [4].
5. **Intensity** - how much is risked, approximated by the character's utility if its opponent's plan succeeds [4].

[1]An preliminary solution was proposed as a poster at AIIDE 2010 [18], but the algorithm has undergone significant revision since then.

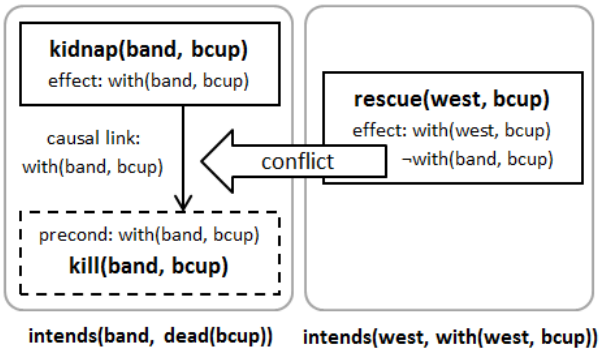

Figure 1: Two intention frames that would arise in *The Princess Bride*: The bandits intend to kill Buttercup, but Westley intends to rescue her. A casual link exists between the effect of one step (*kidnap*) and the precondition of another (*kill*). If a third step (*rescue*) negates the condition, the link is threatened and the plan is flawed [10]. By making some steps hypothetical—in this case, *kill*—my planner removes the flaw, retains the plans of each character, and maintains the causal soundness of the plan.

6. **Balance** - the relative likelihood of each participant to succeed [5].
7. **Resolution** - a character's change in utility once the conflict is over [1].

Each of these dimensions has a *per-participant* value, measured from one character's point of view, and an *overall* value, measured by a God's-eye view.

Whether or not this list is complete remains an open question. Feedback on these dimensions and how to employ them in a generative model is one of the key benefits I perceive from this doctoral consortium. Peer feedback has already been helpful in bringing this list to its current form.

3.3 Example: The Princess Bride

The 1987 film *The Princess Bride* provides an excellent array of example conflicts to illustrate the principles I have laid out above.

The main struggle of the story exists between two participants: a young pirate Westley and the evil Prince Humperdinck. Westley loves a maiden named Buttercup, but Humperdinck wishes to marry her so that he can secretly kill her to start a war. The goals of these two characters lead to mutually thwarting plans: both men cannot marry Buttercup (*subject*). This conflict begins early in the movie and is not resolved until the final scene (*duration*).

At the beginning of the story, Buttercup is kidnapped by a group of bandits. Westley finds himself in a highly *intense* conflict ("Never go in against a Sicilian when death is on the line!") with these bandits to rescue Buttercup. Unbeknownst to him, he is also in a very *indirect* conflict with Humperdinck. Directness increases over time as Westley comes to realize who his true enemies are, and as the two men get geographically closer to one another.

The *balance* of conflict between Westley and Humperdinck shifts from being in favor of Humperdinck to being evenly matched in their final confrontation. Though Westley

is paralyzed and unable to match the prince in physical combat, he is clever enough to outsmart Humperdinck. The eventual resolution of the conflict results in Westley riding off happily with his love, while Humperdinck is humiliated. Clearly this is a win/lose *resolution* in favor of the hero.

When the high level actions of *The Princess Bride* are modeled as a planning domain, my algorithm can discover stories with these same types of conflict. More importantly, the algorithm can also discover a wide range of other conflicts. One key addition that remains to be made is the ability to guide the search based on specific target values for the seven dimensions of conflict.

4. EVALUATION OF THE MODEL

One of the difficulties inherent in developing a formal model of an informal narrative phenomenon is validating it empirically. Thankfully, some precedent exists for evaluating narrative principles in stories generated by POCL planners.

Niehaus and Young demonstrated that plans can be translated into Quest story graphs [11], a psychological model of how readers answer questions about stories [7]. Given a question about the narrative, story graph search can measure how well a candidate answer corresponds to human understanding. It can also detect potential misconceptions of human subjects when their answers differ. I intend to use similar methods to validate two hypotheses:

1. The narratological definition of conflict as thwarted character plans corresponds to a human reader's perception of conflict.

2. The previously identified dimensions of conflict are recognizable characteristics in stories which can be controlled.

After providing evidence that the model accurately reflects human intuition, I intend to place my story generation algorithm in control of a narrative system. This will require a theory of how conflict develops in a narrative—eg. overall balance should increase over time or directness for the villain should decrease over time. It is likely that no one theory accounts for all narratives, so I will identify a specific genra with established tropes, such as the medieval fantasy role playing genera.

Conflict is a key source of audience engagement in stories, and stories are usually structured around their conflicts [1]. This model has great potential to increase the ability of a narrative system to keep its users interested and aware. However, I have not yet devised a means of measuring this. I am eager to receive suggestions about the evaluation of this research from members of the consortium with experience in building and testing narrative systems. It is key that my system be manageable in scope, yet expressive enough to be an interesting prototype.

5. CONCLUSION

Conflict is an ubiquitous and essential narrative phenomenon which has received relatively little focus from story generation research. Borrowing from narratology, I have defined a model of conflict based on thwarted character plans. Each conflict has seven measurable dimensions which can be controlled to produce different kinds of stories. This model informs a planning algorithm built on IPOCL which discovers stories with conflicting plans. I plan to validate this model empirically and implement it in a usable prototype.

This research has applications for many kinds of narrative systems that rely on story generation. Video games with adaptive plots such as *Fable*, *Mass Effect*, and *Dragon Age* stand to benefit from this work by dramatically reducing the cost of pre-scripted content and increasing replay value. Simulation and training systems, such as the ICT *Leaders* project, also stand to benefit from well-structured conflict in the simulations they utilize.

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