StoryVerse: Towards Co-authoring Dynamic Plot with LLM-based Character Simulation via Narrative Planning

Authors: Yi Wang, Qian Zhou, David Ledo

By Ife Kayode

BACKGROUND

- Automated plot generation
  - Standard systems use symbolic narrative planning, which requires pre-defined rules, actions, and a goal for the plot, and limits how complex the plot can be.

- Advancements use LLMs to direct character behaviors & generate plots through the interactions between the characters and their environments.

PROBLEM

- Using LLMs to drive character behaviors makes it hard for writers to control the progression of the plot.

- Goal: To make a plot creation workflow that allows for behaviors produced by LLM based character simulation, and for the writer to have the ability to direct the plot progression.

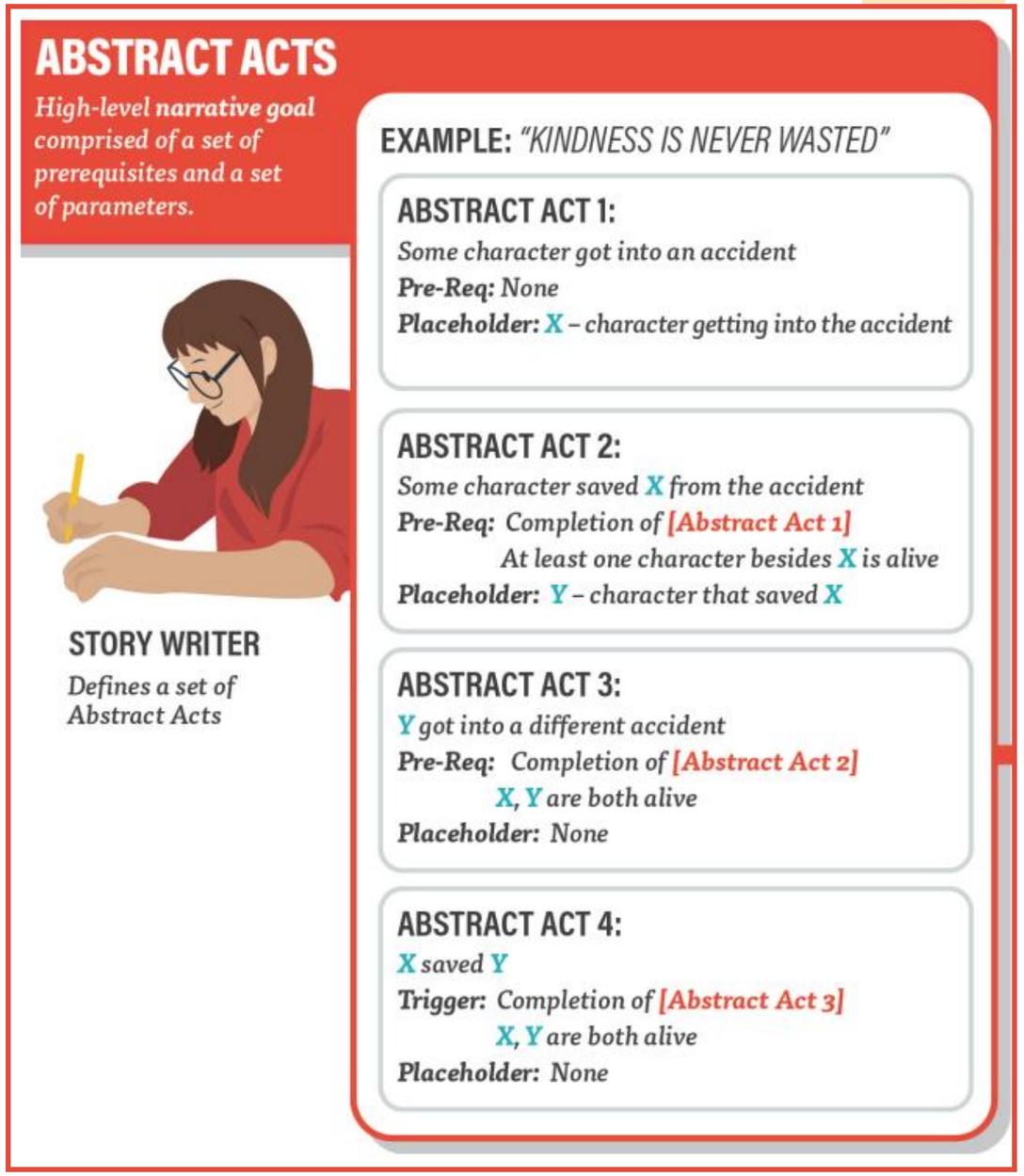
StoryVerse

- Proof-of-concept system to demonstrate the workflow

- Uses the LLM based narrative planning and character simulation to generate stories through “abstract acts”, influenced by the writers.

Abstract Acts

- A novel authorial structure that works with character simulation
- Used to help writers define a high-level plot outline
- Contains a narrative goal, prerequisites, and placeholders

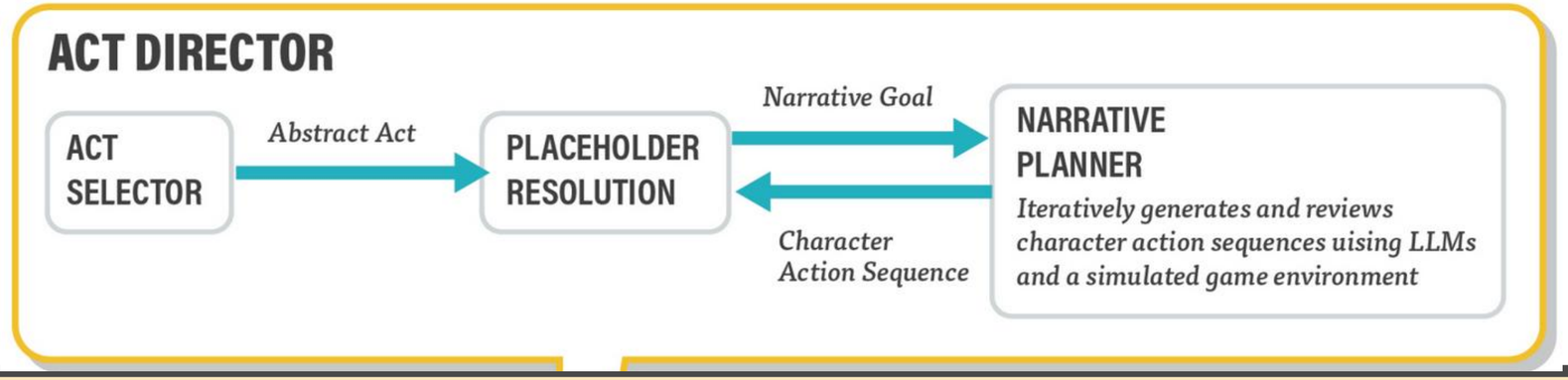


MAJOR COMPONENTS

- Act Director
- Character Simulator
- Game Environment

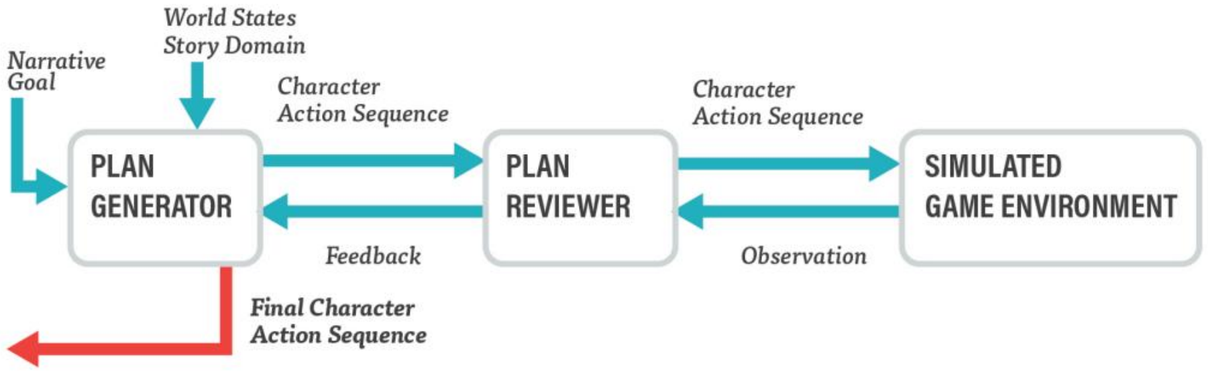
ACT DIRECTOR

- Processes the abstract acts and uses an LLM narrative planner to generate sequences of character actions.
- Replaces placeholders in the narrative goal with content established when previous abstract acts where processed.
  - EX: "**X** got into an accident" ⟶ "**The ant** got into an accident"



ACT DIRECTOR PT. 2

- Plan Generator takes the narrative goal, world state, and story domain
- Generates a plan
- Plan Reviewer provides feedback
- Plan Generator revises the action sequence using feedback



EXAMPLE OF PLAN GENERATION

The Plan Generator creates an initial character sequence. The Plan Reviewer tries to execute the plan but results in failure.

This leads to feedback that questions the executability of the action sequence.

The Plan Reviwer further comments on the motivation of the actions and provides suggestions.

This feedback is provided to the Plan Generator which revises the plan by having the hunter move to the oak tree to try to kill the dove.

PLAN GENERATOR

I need to rest after saving the ant, and the oak tree seems safe.

`Dove.MoveTo(OakTree)`

I saw the dove flying towards the oak tree, I need to follow it.

`Hunter.MoveTo(Brook)`

This is my chance to kill the dove while it's resting.

`Hunter.TryToKill(Dove)`

PLAN REVIEWER

Hunter.TryToKill(Dove) is not executable because hunter is not in the same location as dove. Hunter should move to OakTree before taking this action.

Feedback:
If the hunter's goal is to keep the dove in sight or follow it, the logical action would be moving toward the oak tree, not the brook. the action contradicts the hunter's motivation.

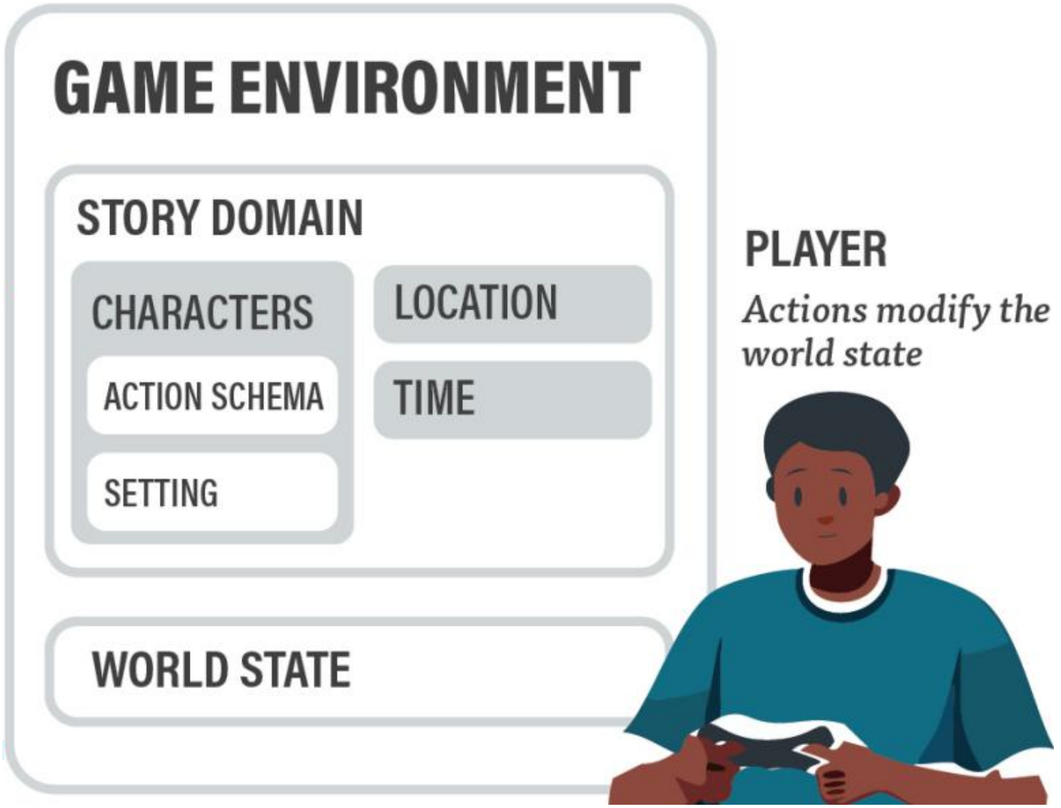
CHARACTER SIMULATOR

- Generates character actions when there's no available input (abstract acts) from the writer.

GAME ENVIRONMENT

- Contains a story domain which specifies character actions that can be executed

- Maintains the world state
  - Holds character locations, attributes, simulation memories, etc.



FULL SYSTEM

In Each Timestep:

1. Act Selector evaluates if there are pending acts that have met their prereqs.
2. If so, the Act Director processes them and generates actions.
3. If not, the Character Simulator will generate actions.
4. Game Environment executes actions and updates world states.
5. Game Environment sends updated states back to Act Director.

ABSTRACT ACTS

High-level narrative goal comprised of a set of prerequisites and a set of parameters.

EXAMPLE: *"KINDNESS IS NEVER WASTED"*

ABSTRACT ACT 1:
Some character got into an accident
Pre-Req: *None*
Placeholder: *X – character getting into the accident*

ABSTRACT ACT 2:
Some character saved X from the accident
Pre-Req: *Completion of [Abstract Act 1]*
At least one character besides X is alive
Placeholder: *Y – character that saved X*

ABSTRACT ACT 3:
Y got into a different accident
Pre-Req: *Completion of [Abstract Act 2]*
X, Y are both alive
Placeholder: *None*

ABSTRACT ACT 4:
X saved Y
Trigger: *Completion of [Abstract Act 3]*
X, Y are both alive
Placeholder: *None*

STORY WRITER
Defines a set of Abstract Acts

ACT DIRECTOR

ACT SELECTOR → *Abstract Act* → **PLACEHOLDER RESOLUTION**

Narrative Goal →
← *Character Action Sequence*

NARRATIVE PLANNER
Iteratively generates and reviews character action sequences uising LLMs and a simulated game environment

STORYVERSE

A plot creation workflow that mediates between the creative input from the story writer and the emergent behaviors exhibited by the simulated characters

ACT DIRECTOR
Enables narrative planning, creates concrete sequence of character actions

CHARACTER SIMULATOR
Generates character actions

Character Action Sequence →

World States Story Domain ←

GAME ENVIRONMENT

STORY DOMAIN
- CHARACTERS
- LOCATION
- ACTION SCHEMA
- TIME
- SETTING

WORLD STATE

PLAYER
Actions modify the world state

EXAMPLES & RESULTS

- Tested using 2 story domains
  - *The Ant & Dove* and *The Ville*
- Used gpt-4-0125- preview as the LLM
- All acts were completed successfully
- Found that the system will adapt to different world states

STRENGTHS

- Properly explains each component of the system
- Included a discussion of their results, and limitations of their system for practical use
  - LLM issues with coherence
  - Constant LLM calls
- Mentioned possible solutions to the limitations
  - Retrieval-Augmented Generation
  - Hierarchical generation
  - Increased context window

WEAKNESSES

- Only provided results from 2 story domains and 1 model

THANK YOU

REFERENCES

Yi Wang, Qian Zhou, David Ledo (2024). StoryVerse: Towards Co-authoring Dynamic Plot with LLM-based Character Simulation via Narrative Planning.