Automatic Plot Generation Framework for Scenario Creation

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The game market is expanding globally

Scenarios are also increasing

- Develop a system that automatically generates plot of scenarios for writers
- Use a thirteen-phase structure
Procedure for creating a scenario

We assume scenarios used for games, movies, dramas and animations.

- Logline
  - Rough plot
- Plot
  - Scenario design drawing
  - Represent an outline of a scenario
Bates et al. (92), Mateas et al. (03), Thue et al. (07) and Magerko et al. (06) proposed systems using planning method.

Sato et al. (15) developed a system aiming at the automatic generation of short short novels.

Satoshi Sato, What is Automatic Story Generator?, The 29th Annual Conference of the Japanese Society for Artificial Intelligence, 2015
In the related work, an almost completed scenario is outputted.

The degree of freedom of the story is small.
The story lacks diversity.
Plot generation method

- A high degree of freedom
- Does not cause story collapse

We introduced a narrative structure for automatic generation

Generated a plot which is the first stage of the scenario

- Logline
- Plot
- Draft script
- First draft
- Final manuscript
Plot generation mechanism

Input

Logline

Extraction of story information by logline

Story information

Scenario plot database

Thirteen-phase structure

Generation of main character

Character information

Character setting

Elimination of contradictions

Plot generation

Output

Plot
Plot generation mechanism

- Input:
  - Logline
  - Extraction of story information by logline

- Story information

- Character information:
  - Generation of main character
  - Character setting

- Thirteen-phase structure

- Elimination of contradictions

- Plot generation

- Scenario plot database

- Output:
  - Plot
Input

• To generate a plot from a logline, it is necessary to extract story information such as “what kind of character”, “what kind of place” and “what to do” from the logline.

• We selected preset items from created loglines and extract them.
Plot generation mechanism

Input

- Logline

Extraction of story information by logline

Story information

Character information

- Generation of main character
- Character setting

Thirteen-phase structure

Elimination of contradictions

Plot generation

Scenario plot database

Output

Plot

Plot generation mechanism

Input

- Logline

Extraction of story information by logline

Story information

Character information

- Generation of main character
- Character setting

Thirteen-phase structure

Elimination of contradictions

Plot generation

Scenario plot database

Output

Plot
Thirteen-phase structure

Act 1
- [setup]
  - 01 day-to-day world
  - 02 occurrence of an accident.
  - 03 conflict and resolution point of determination

Act 2
- [confrontation]
  - 04 behavior and predicament
  - 05 support
  - 06 change and further predicament
  - 07 switching big view turning points
  - 08 adversity and trials
    - 09 crisis
    - 10 clue

Act 3
- [resolution]
  - 11 confrontation
  - 12 elimination of obstacles
  - 13 solving and satisfaction
Thirteen-phase structure

• The thirteen-phase structure is the theoretical framework of a story advocated by Kaneko Mitsuru

• Based on the 31 functions in Vladimir Propp’s “Structure of fairytales”

• This is an expansion of the three-act structure

Plot generation mechanism

Input

Logline

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Thirteen-phase structure

Elimination of contradictions

Plot generation

Scenario plot database

Output

Plot

The 21st Century Keio University
Creation of a scenario plot database

- 94 plot samples created by professional scenario writers
  - Based on the thirteen-phase structure

- Each element of a plot is regarded as one block.
  - In each block, tags related to “genre,” “era,” “place,” and “corresponding number of thirteen-phase structures” are exists
Plot generation mechanism

Input

Logline

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Character information

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Thirteen-phase structure

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Plot generation

Output

Scenario plot database

Plot
Application of thirteen-phase structure

- A plot based on the thirteen-phase structure is configured.
- “Triggering event”, “era”, “genre”, “ending” and “life and death of the main character” are extracted as story information conditions and used
- In the scenario plot, a block unit that matches the extracted conditions is selected
- The priority of block selection is in the order of
  - Thirteen-phase structure’s roles of each block in the story is matched
  - Age of the logline is matched
  - Genre is matched
Plot generation mechanism

Input

Logline

Extraction of story information by logline

Story information

Thirteen-phase structure

Generation of main character

Character information

Character setting

Elimination of contradictions

Scenario plot database

Plot generation

Output

Plot
Generation of main character

Main character’s behavior is consistent

Consistency in a scenario can be secured

• The inconsistency of an action of the main character caused is corrected.
  – The action of the main character is changed by word-base correction
  – A sentence, in which a main character performs an action, is extracted, and a morphological analysis is performed.
  – Words that does not matched in “genre,” “era,” or “role on the story” are replaced with matching words in the database.
Plot generation mechanism

Input

- Logline

Extraction of story information by logline

Story information

- Character information
  - Generation of main character
  - Character setting

- Thirteen-phase structure

Scenario plot database

Elimination of contradictions

Output

- Plot generation

Plot
Elimination of contradictions

• Eliminate contradictions in the story such as characters who have not appeared so far or have died that appear suddenly.

• If such a character occurs in the plot, it is replaced with another character. Alternatively, the description is deleted.
Plot generation mechanism

Input

Logline

Extraction of story information by logline

Story information

Thirteen-phase structure

Scenario plot database

Character information

Generation of main character

Character setting

Elimination of contradictions

Plot generation

Output

Plot
1. “A” makes a date with “B”.
2. “A” notices that there is a discrepancy between the record of “A”’s memory chip and his own memory.
3. “A” decides to stop the robot running away to protect the city.
4. “A” repeated trial and error to cook space food to be more delicious.
5. “A” will discover the fountain. “A” is impressed by the taste of the water.
6. “A” invades the laboratory with the help of “E”. “A” and “E” repair the robot control system of the laboratory to stop the robot running away in the city. The city robot returns to normal. The robot in the city resumes running away.
7. “A” thinks about the reason why the robot in the city is running away. “A” notices that “D” is the cause of the robot in the city running away.
8. “A” thinks to stop “D” by turning off its power. “A” and “E” look for devices to turn off the power while avoiding attacks from the city robots.
9. “A” confronts “D” to stop the huge weapons. However, “A” can not defeat “D”. “A” huge weapon finishes powering up. The laboratories of “A” lose the fight.
10. “A” reads a book that “E” gave to distract his sorrow. “A” can laugh for the first time after the death of “E” because of that book.
11. “A” will continue walking with painful feet.
12. “A” knocks down “D”.
13. “A” returns to the Earth.
Evaluation experiment

- Evaluation experiment setting
  - Age of main character: 16
  - Occupation: student
  - Trigger event: meet unexpected people
  - Stage: the world
  - Era: the future
  - Genre: SF
  - Ending: the main character succeeds in eliminating obstacles
  - Main character’s life or death: life
Evaluation experiment

• Evaluators were 17 professional scenario writers
• Scenario created by scenario writer: 2, Scenario generated automatically: 3, Total 5
• All plots were based on the premise that it was created by a scenario writer
• The questionnaire was prepared on the basis of the analysis items of the scenario used by a script doctor
### Evaluation experiment

- **Questionnaire items**

<table>
<thead>
<tr>
<th>Number</th>
<th>Question item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Do you think the story is consistent?</td>
</tr>
<tr>
<td>Q2</td>
<td>Was the story easy to read?</td>
</tr>
<tr>
<td>Q3</td>
<td>Is the theme of the story clearly implied?</td>
</tr>
<tr>
<td>Q4</td>
<td>Is the motif of the story clearly implied?</td>
</tr>
<tr>
<td>Q5</td>
<td>Do you feel a originality in the idea?</td>
</tr>
<tr>
<td>Q6</td>
<td>Do you feel the reality of the story?</td>
</tr>
<tr>
<td>Q7</td>
<td>Is there a catharsis in the story?</td>
</tr>
<tr>
<td>Q8</td>
<td>Do you agree with the ending of the story?</td>
</tr>
<tr>
<td>Q9</td>
<td>Is the character of the story attractive?</td>
</tr>
<tr>
<td>Q10</td>
<td>Is the amount of content in the story appropriate?</td>
</tr>
</tbody>
</table>
Evaluation experiment

• Each question item was scored by using a five-stage evaluation (1: lowest, 5: highest)

• The plots to be evaluated were named A, B, C, D and E.
  – A and B were created by scenario writers, with the remainder being automatically generated by the proposed method.

• At the end of the questionnaire, we asked the evaluators to select two plots they believed the plots were automatically generated.
Experimental result

- Questionnaire results (average & standard deviation)

A, B: created by the scenario writer
C, D, E: automatically generated
Experimental result

- Result of Q1 & result of Q5

Do you think the story is consistent?

Do you feel a originality in the idea?

A, B: created by the scenario writer
C, D, E: automatically generated
Experimental result

- Result of Q1 & result of Q5

Do you think the story is consistent?

Do you feel a originality in the idea?

High Rating

A, B: created by the scenario writer
C, D, E: automatically generated
Experimental result

• Result of Q1 & result of Q5

Do you think the story is consistent?

Do you feel a originality in the idea?

High Rating

A, B: created by the scenario writer
C, D, E: automatically generated
Experimental result

Result of evaluators assumption of generated plots

A, B: created by the scenario writer
C, D, E: automatically generated
Conclusion and future work

Conclusion

• From the evaluation results, it can be said that the proposed method was able to achieve our purpose to some extent
  – If we get rid of the contradictions of the plot and strengthen the consistency of the story, we can not generate various scenarios.
  – Balancing between originality and consistency is required in the creation of stories.

Challenge

• The automation of creating a scenario plot database, and system improvements to reduce contradictions

Future work

• We would like to automatically generate plots other than those in the SF genre.
• Also we want to generate a more complicated story than the plot.
Thank you

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