Role of Pattern Recognition in Computer Games

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Overview

- **World**
  - Requested actions
  - Possible actions
    - Primitive events and states
    - Previous primitives
    - Pattern recognition
      - Observed events and states
      - Decision-making system
Views to PR in CGs
Or: A Ragbag of Ramblings

- motivation
  - where PR can be applied
  - what are its roles
  - what is expected from it

- views
  1. Level of Decision-Making
  2. Stance Towards the Player
  3. The Challenge of Story Generation
  4. Prediction and Production
1. Level of Decision-Making

- **strategical**
  - what should be done
- **tactical**
  - how to actuate it
- **operational**
  - how to carry it out
Strategical Level

- long-term decisions
- large amount of data, which is filtered to bring forth the essentials
- speculative (What-If scenarios)
- done off-line or in the background
- the cost of a wrong decision is high

→ high-quality but possibly slow PR methods
Tactical Level

- medium-term decisions
- selected set of data, which must be scrutinized
- considers a group of entities and their cooperation

→ aggregating and on-line PR methods
Operational Level

- short-term decisions
- data is concrete and closely connected to the game world
- the cost of a wrong decision is relatively low

→ reactive real-time PR methods
2. Stance Towards the Player

- enemy
- ally
- neutral
Enemy

- provides challenge
- must demonstrate intelligent (or at least purposeful) behavior

→ PR methods to aid computer’s decision-making
Ally

- augmenting the user interface
  - hints and guides
- aiding the human player
  - reconnaissance officer
  - teammates

→ PR methods from the human point of view
Neutral

- commentator
  - highlighting events and providing background information
- camera director
  - choosing camera views and angles
- referee
  - judging the rule violations

→ PR depends on the context and conventions
3. The Challenge of Story Generation

- game: in a given situation the player has a set of actions to choose from
- open game world
  - the range of possible actions is wide
  - the player can choose freely
- simulation is an obvious implementation
- however, simulation $\neq$ game
  - games are goal-oriented!
Progression as a Graph

Linear

Conjoining

Forking

Unfolding

\[ s_i \xrightarrow{a_1} s_j \]

\[ s_i \xrightarrow{a_2} s_j \xrightarrow{a_3} s_n \]

\[ s_i \xrightarrow{a_2} s_j \xrightarrow{a_3} s_k \]

\[ s_i \xrightarrow{a_2} s_j \xrightarrow{a_3} s_k \xrightarrow{a_4} s_m \]
Embedding a Story into a CG

- nowadays
  - usually linear progression
  - freedom only between fixed entry points
- story-generating program must observe
  - the current situation
  - the game history
  - the players’ reactions
→ hey, this is PR!
Let’s Tell a Story

I have a quest.

I’m lost.

Robbery

Here’s a hint!
4. Prediction and Production

- time series data
- world = a generator of events and states, which can be labeled
- prediction
  - what the generator will produce next?
  - PR over time
- production
  - simulating the output of the generator
  - utilizes prediction
Prediction

Generator

Modeller

maximum probability
Production

random selection from probability distribution

Modeller

random selection from probability distribution
Conclusion

- this has been PR on PR
- PR has different roles in a CG
- implementation depends on the role
  - source data
  - time demand
  - quality of result
  - end-user (human or computer)
- for humans games are all about PR — why not for computers too