

The Right to Remember: Implementing a Rudimentary Emotive-Effect Layer for Frustration on AI Agent Gameplay Strategy

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Aim

Introduce the Emotive Effect Layer that manages the incoming data variables and makes alterations to accentuate or diminish their effects.

Love Letter

Overview

1. Shuffle the deck and remove a single card.
2. Each player takes one card from the deck.
3. Turn player takes one card from the deck and chooses which of their two cards in hand to discard.
4. Solve the effect of discarded card.
5. Until game ends, repeats 3 and 4.

End conditions are when all players but one have been eliminated, or there are no more cards in the deck to draw from.

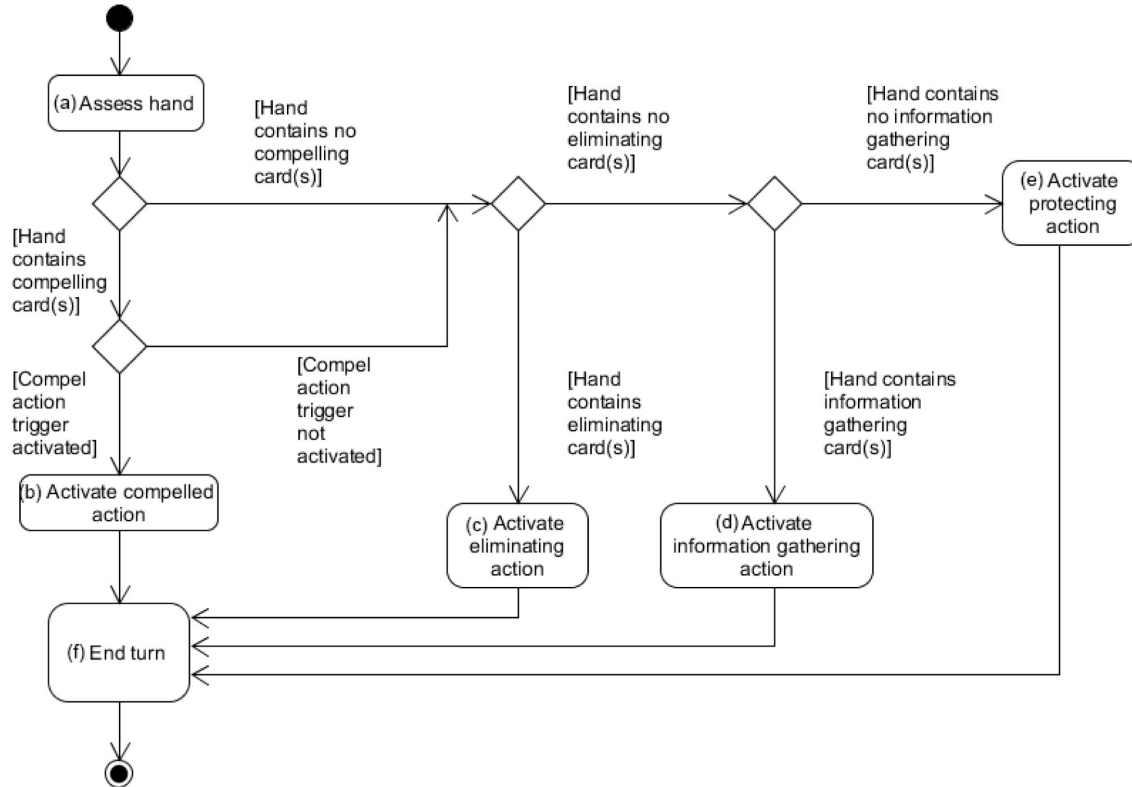
Love Letter

Categories

- Eliminating Cards
Cards that can be used, under certain conditions, to eliminate other players from the round.
- Information-gathering Cards
Cards that can be used to get information about the card the opponent might hold.
- Protection Cards
Cards that are used by players to prevent them being a legal target for other player's card effects.
- Compelling Cards
Cards which serve no other function than that they compel an action of the player in the event that they are required to be discarded.

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Developed Default Strategy



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The condition to override strategy

- If a probability analysis suggested that an alternative play would increase the chance of winning.
- In the event that previously-gained information suggested that an alternative play would guarantee the agent protection from losing.

Phase-I Testing

The starting player

win: 537,128

draw: 101

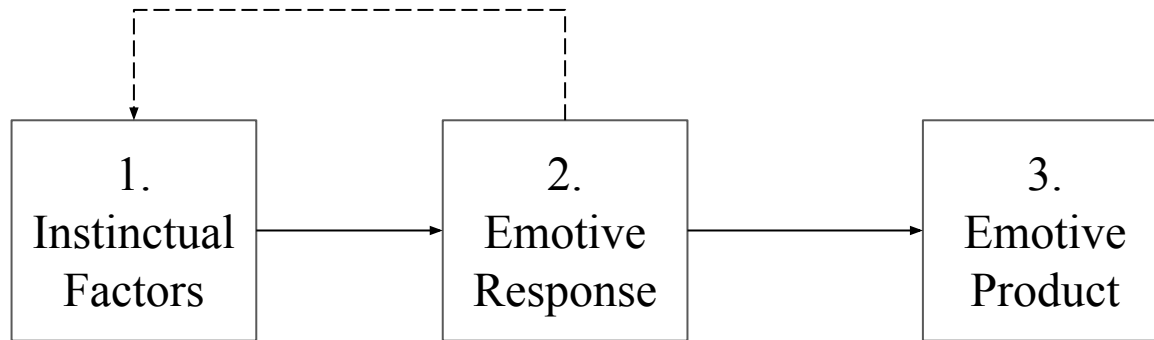
lose: 462,771

1. The probability of a game ending in a tie, on average, would be so unlikely as to be insignificant in comparison to winning or losing.
2. There is some statistically significant advantage to taking the first turn.

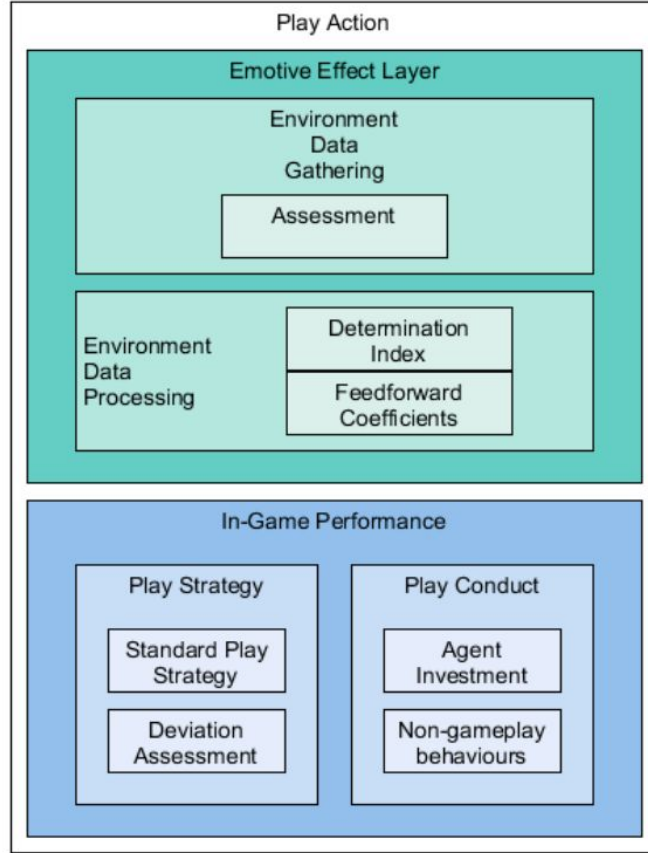
Frustration

Frustration will cause:

- the player to become more determined in their pursuit of victory.
- the player to give up, and accept their imminent defeat, etc.



Emotive Effect Layer



A determination index is derived as a product of the agent's investment value, previous determination index score, and a valence spike coefficient.

Each variables will take form 0.0 to 1.0.

Figure 4. The revised-play action deconstructed into distinct layers of activity.

Emotive Effect Layer

Algorithm:

1. Gathers information from used deck, hands, and others. After that, calculates probability, but some associated coefficient will makes the result more correct, or more inaccurate.
2. The agent performs their turn action.
3. Steps 1 and 2 are repeated until game end.
4. Analyze game result and calculates a determination index, agent investment, and valence spike value according based on frustration profiles taken from human player observations.
5. Based on new determination index, determine next condition.

Phase-II Testing

Experimentation

1. Agent investment should steadily increase in value during match play IF the win-loss ratio for the agent remains close to one. Other negative consequence effects during this eventuality should have lesser impact, as well.
2. Agent investment should increase rapidly IF the game concludes with a loss, but took greater than 10 turns to complete.
3. Agent investment should decrease rapidly IF the win-loss ratio for the agent reaches towards a critical point for match play.
4. Agent investment should decrease rapidly IF the game concludes with a loss and in fewer than 3 turns.
5. The agent's ability to calculate probability should reduce IF the agent suffers a number of losses in quick succession, comparable with effects of “tilting”.
6. The agent will end the match IF the agent investment value is sufficiently low (<0.15) and the win-loss ratio suggests that match play is reaching a critical point.

Phase-II Testing

Result

Table 1. Phase-II Results after 10^5 matches.

Losses		72,497
Win-Loss Ratio (% of total matches)	Complete Victory (6:0)	0.00
	6.00 (6:1)	0.00
	3.00 (6:2)	<0.01
	2.00 (6:3)	3.57
	1.50 (6:4)	9.25
	1.00 (5:5)	14.68
	0.67 (4:6)	16.24
	0.50 (3:6)	42.67
	0.33 (2:6)	9.38
	0.17 (1:6)	4.21
	0.00 (0:6)	0.00
Initial Agent Investment (each match)		0.5000
Final Agent Investment (mean)		0.2219
Mean Agent Investment Shift (per game)		−0.0984

Conclusion

EEL is partially successful as a model for managing emotional effects.

However, this success comes with several limitations.

- Too complex
- impractical to implement in game agents
- a lack of sufficient abstraction.
- only text-based
- focus solely on frustration

Thank you for your attention!