**Project 3**

**Game Description**

**Overview**

This game models social interactions with an NPC in a simulated environment, where the player must build a friendship by reaching a target relationship score of 100 or above. The player is given a limited number of interactions (10) to achieve this score, requiring careful decision-making. Each interaction has a probabilistic effect on the NPC’s relationship score, with both positive and negative actions influencing the NPC’s attitude. Negative actions come with a risk-reward system, where they have a chance to provide significant boosts or large penalties, encouraging the player to take calculated risks rather than simply relying on positive actions. The NPC’s relationship status, tracked as Friendly, Neutral, or Hostile, adapts based on the cumulative score, providing an immersive social experience.

**Search Methods**

This game uses a simplified Dynamic Bayesian Network (DBN) inspired model, where each action influences the NPC’s relationship score with the player. The DBN updates the likelihood of each relationship state (Friendly, Neutral, Hostile) based on previous interactions and risk factors. Two main search approaches are employed: a **threshold-based state search** to update the NPC’s state based on the relationship score, and a **probabilistic evaluation** within the risk-reward system that assigns a chance of positive or negative outcomes for riskier actions.

**Outline of Search Logic**

* **Initialize Relationship Score**: NPC’s relationship score starts at a neutral baseline of 50
* **Timed Interaction Count**: Track the number of interactions (up to 10).
* **Action Effects:**
  + Positive Actions (e.g., Greet, Compliment, Trade): Increment relationship score within a preset range.
  + Risk-Reward Actions (e.g., Insult, Challenge): Implement a probabilistic effect, with a chance of either significantly increasing or decreasing the relationship score.
* **NPC State Update:**
  + If the relationship score >= 75, set NPC state to "Friendly"
  + If the relationship score <= 25, set NPC state to “Hostile”
  + Otherwise, set NPC state to “Neutral”
* **Win/Lose Condition:**
  + **Win:** Reach a relationship score of 100+ within the interaction limit.
  + **Lose:** Fail to reach the target score within the allowed interactions.

**Flowchart**

The flowchart below shows the primary steps and decision point’s in the game’s logic, following the setup described above:

