AI-BASED NUMBER GUESSING GAME

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Introduction

The AI-based Number Guessing Game is a simple yet fascinating implementation of artificial intelligence. In this game, the AI tries to guess a number that the user has thought of, by using feedback such as "higher", "lower", or "correct". The game mimics the concept of binary search, where the AI guesses in the middle of the current range, adjusting the range based on the user's feedback.

The primary objective of this game is to demonstrate how artificial intelligence can use logical deduction and binary search to make accurate predictions efficiently. The AI

interacts with the user through a series of guesses, and the goal is for the AI to guess the correct number in the least number of attempts.

This number guessing game serves as a fun and educational way to understand the fundamentals of AI and search algorithms in a practical context. The approach optimizes the guessing process by narrowing the possible choices based on the user's responses, allowing the AI to converge on the correct number quickly.

Methodology

The AI-based number guessing game works by employing the binary search algorithm, which is an efficient searching technique. The game operates on the following steps:

Initial Setup: The user selects a number between a predefined range (1 to 100). The AI then starts guessing numbers within this range.

AI's First Guess: The AI makes its first guess by selecting the middle value between the lower and upper bounds. For instance, if the range is 1 to 100, the AI guesses 50.

User Feedback: The user provides feedback based on the guess:

"higher" if the AI's guess is lower than the user's number.

"lower" if the AI's guess is higher than the user's number.

"correct" if the AI has guessed the number correctly.

Adjusting the Range: Based on the feedback, the AI narrows the range:

If the user responds "higher", the AI adjusts the lower bound to be one more than the current guess.

If the user responds "lower", the AI adjusts the upper bound to be one less than the current guess.

Repetition: The process repeats, with the AI making a new guess based on the adjusted range, until the correct number is guessed.

Ending the Game: Once the AI guesses the number correctly, the game ends and the number of attempts is displayed.

The binary search ensures that the AI always guesses the number in at most $\log_2(n)$ attempts, where n is the range of possible numbers. In this case, since the range is from 1 to 100, the AI will guess the number in at most 7 attempts.

Code

```
import random

def ai_guessing_game():
    print("Welcome to the AI-based Number Guessing Game!")
    print("Think of a number between 1 and 100 and keep it in your mind.")
    print("I will try to guess your number by asking if it's higher, lower, or correct.")


    low = 1
    high = 100
    attempts = 0
```

```
    while True:
        attempts += 1
        guess = (low + high) // 2  # AI guesses the middle number
        print(f"\nIs your number {guess}?")

        feedback = input("Please respond with 'higher', 'lower', or 'correct': ").lower()

        if feedback == "higher":
            low = guess + 1  # Adjust lower bound of range
        elif feedback == "lower":
high = guess - 1  # Adjust upper bound of range
```

```
        elif feedback == "correct":
            print(f"\nYay! I guessed your number {guess} in {attempts} attempts!")
            break
        else:
            print("Invalid input. Please respond with 'higher', 'lower', or 'correct'.")


if _name_ == "_main_":
    ai_guessing_game()
```

Screenshots Output photo pasted

```python
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def ai_guessing_game():
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    low = 1
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    while True:
        attempts += 1
        guess = (low + high) // 2
        print(f"\nIs your number {guess}?")

        feedback = input("Please respond with 'higher', 'lower', or 'correct': ").lower()

        if feedback == "higher":
            low = guess + 1
        elif feedback == "lower":
            high = guess - 1
        elif feedback == "correct":
            print(f"\nYay! I have guessed your number {guess} in {attempts} attempts!")
            break
        else:
            print("Invalid input. Please respond with 'higher', 'lower', or 'correct'.")

if __name__ == "__main__":
    ai_guessing_game()
```

```
Welcome to the AI-based Number Guessing Game!
Think of a number between 1 and 100 and keep it in your mind.
I will try to guess your number by asking if it's higher, lower, or correct.

Is your number 50?
Please respond with 'higher', 'lower', or 'correct': lower

Is your number 25?
Please respond with 'higher', 'lower', or 'correct': higher

Is your number 37?
Please respond with 'higher', 'lower', or 'correct': higher

Is your number 43?
Please respond with 'higher', 'lower', or 'correct': lower

Is your number 40?
Please respond with 'higher', 'lower', or 'correct': higher

Is your number 41?
Please respond with 'higher', 'lower', or 'correct': higher

Is your number 42?
Please respond with 'higher', 'lower', or 'correct': correct

Yay! I have guessed your number 42 in 7 attempts!
```