**Project 3: “AI” Game Using Binary Tree**

**Description:**

You design your guessing game based on a series of questions. Each question has a “Yes” and a “No” answer. You can think of “Yes” as the link to left-child node and “No” as the link to the right-child node. These links lead to a path when you can make a conclusion at the leaf-node. You can pick any domain subject to create this game. It can be a “Movie Guessing Game” as my example or a car guessing or an animal identification game, etc.

**Code:**

import java.util.Scanner;

class BinaryTreeNode {

String data;

BinaryTreeNode yesNode;

BinaryTreeNode noNode;

BinaryTreeNode(String data) {

this.data = data;

this.yesNode = null;

this.noNode = null;

}

}

public class AnimalIdentificationGame {

private BinaryTreeNode root;

public AnimalIdentificationGame() {

root = new BinaryTreeNode("Does it have four legs?");

}

public void playGame() {

Scanner scanner = new Scanner(System.in);

boolean continuePlaying = true;

while (continuePlaying) {

BinaryTreeNode currentNode = root;

while (currentNode.yesNode != null) {

System.out.println(currentNode.data);

String answer = scanner.nextLine().toLowerCase().trim();

if (answer.equals("yes")) {

currentNode = currentNode.yesNode;

} else if (answer.equals("no")) {

currentNode = currentNode.noNode;

} else {

System.out.println("Please answer with 'yes' or 'no'.");

}

}

System.out.println("Is it a " + currentNode.data + "?");

String answer = scanner.nextLine().toLowerCase().trim();

if (answer.equals("yes")) {

System.out.println("I guessed it! Do you want to play again? (yes/no)");

String playAgain = scanner.nextLine().toLowerCase().trim();

if (!playAgain.equals("yes")) {

continuePlaying = false;

}

} else if (answer.equals("no")) {

System.out.println("I give up. What is the animal?");

String animalName = scanner.nextLine();

System.out.println("Please provide a yes/no question to distinguish " + animalName + " from " + currentNode.data);

String newQuestion = scanner.nextLine();

System.out.println("Is the answer 'yes' for " + animalName + "? (yes/no)");

String answerForNewQuestion = scanner.nextLine().toLowerCase().trim();

BinaryTreeNode newNode = new BinaryTreeNode(animalName);

BinaryTreeNode oldNode = new BinaryTreeNode(currentNode.data);

if (answerForNewQuestion.equals("yes")) {

currentNode.data = newQuestion;

currentNode.yesNode = newNode;

currentNode.noNode = oldNode;

} else {

currentNode.data = newQuestion;

currentNode.yesNode = oldNode;

currentNode.noNode = newNode;

}

System.out.println("Game updated. Do you want to play again? (yes/no)");

String playAgain = scanner.nextLine().toLowerCase().trim();

if (!playAgain.equals("yes")) {

continuePlaying = false;

}

} else {

System.out.println("Please answer with 'yes' or 'no'.");

}

}

}

public static void main(String[] args) {

AnimalIdentificationGame game = new AnimalIdentificationGame();

System.out.println("Welcome to the Animal Identification Game!");

// Add some animal data to start the game

game.root.yesNode = new BinaryTreeNode("Does it roar?");

game.root.noNode = new BinaryTreeNode("Does it hop?");

game.root.yesNode.yesNode = new BinaryTreeNode("Lion");

game.root.yesNode.noNode = new BinaryTreeNode("Tiger");

game.root.noNode.yesNode = new BinaryTreeNode("Kangaroo");

game.root.noNode.noNode = new BinaryTreeNode("Rabbit");

game.playGame();

}

}

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