CAP 4053 Artificial Intelligence for Computer Games: Knowledge Representation

Knowledge Representation for CAP 4053 Artificial Intelligence for Computer Games

Knowledge representation is the process of encoding knowledge into a form that can be used by a computer. It is an important part of artificial intelligence (AI) and is used to create intelligent agents that can interact with their environment and make decisions. In this lecture, we will discuss the different types of knowledge representation, how they are used in AI, and how they can be applied to computer games.

Types of Knowledge Representation

There are several different types of knowledge representation, each with its own strengths and weaknesses. The most common types are:

- **Logic-based Representation**: This type of knowledge representation uses logical statements to represent facts and rules. It is used in rule-based systems and expert systems.

- **Frame-based Representation**: This type of knowledge representation uses frames to represent objects and their properties. It is used in object-oriented programming and natural language processing.

- **Semantic Network Representation**: This type of knowledge representation uses graphs to represent relationships between concepts. It is used in natural language processing and machine learning.

- **Conceptual Graph Representation**: This type of knowledge representation uses directed graphs to represent relationships between concepts. It is used in natural language processing and machine learning.

Coding Examples

Example 1: Logic-based Representation

```
Start of Code
// This code example shows how to use logic-based representation to represent a simple fact.
fact: John is a student.
logic-based representation:
John(student).
End of Code
```

Example 2: Frame-based Representation

```
Start of Code
```

```
// This code example shows how to use frame-based representation to represent a simple object.
object: car
frame-based representation:
car {
    color: "red";
    make: "Honda";
    model: "Civic";
    year: 2020;
}
End of Code
```

Example 3: Semantic Network Representation

```
Start of Code
// This code example shows how to use semantic network representation to represent a simple relationship.
relationship: John is a student of Mary.
semantic network representation:
John --is_a_student_of--> Mary
End of Code
```

Example 4: Conceptual Graph Representation

```
Start of Code
// This code example shows how to use conceptual graph representation to represent a simple concept.
concept: John is a student.
conceptual graph representation:
John --is_a--> student
End of Code
```

Practice Multiple Choice Questions

1. What type of knowledge representation is used in object-oriented programming?

A. Logic-based Representation

B. Frame-based Representation

C. Semantic Network Representation

D. Conceptual Graph Representation

Answer: B. Frame-based Representation