Introduction to Artificial Intelligence

Build Questions Answering System based on Ontology

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Outline

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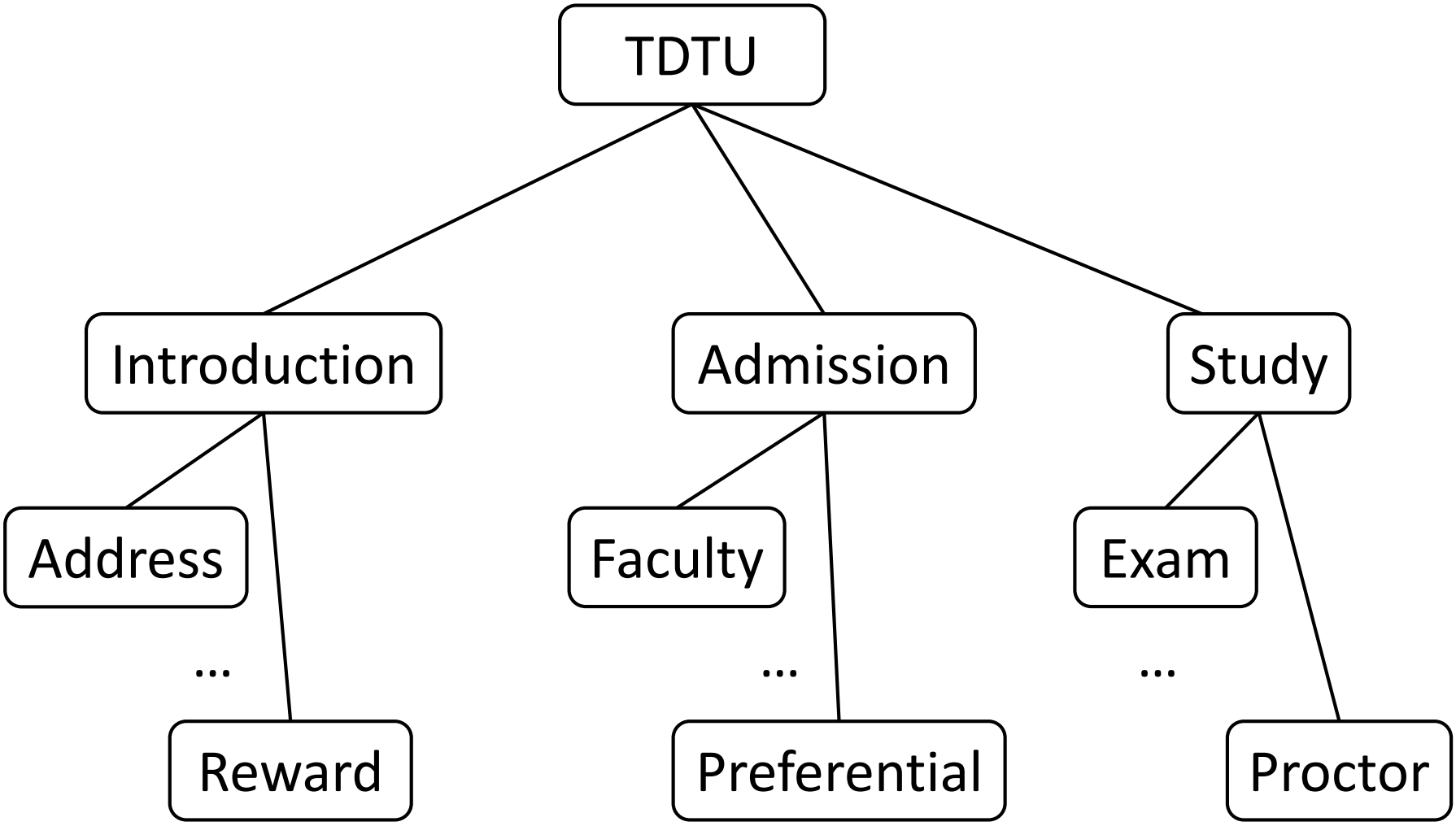
Ontology concept

In computer science and information science, an ontology encompasses a representation, formal naming, and definition of the categories, properties, and relations between the concepts, data and entities that substantiate some, or many domains of a topic.

An ontology can treat as a knowledge tree, with each node on the tree represent a category of topic, and leaves archive content of the parent node.

Ontology concept



Ontology concept

Components:

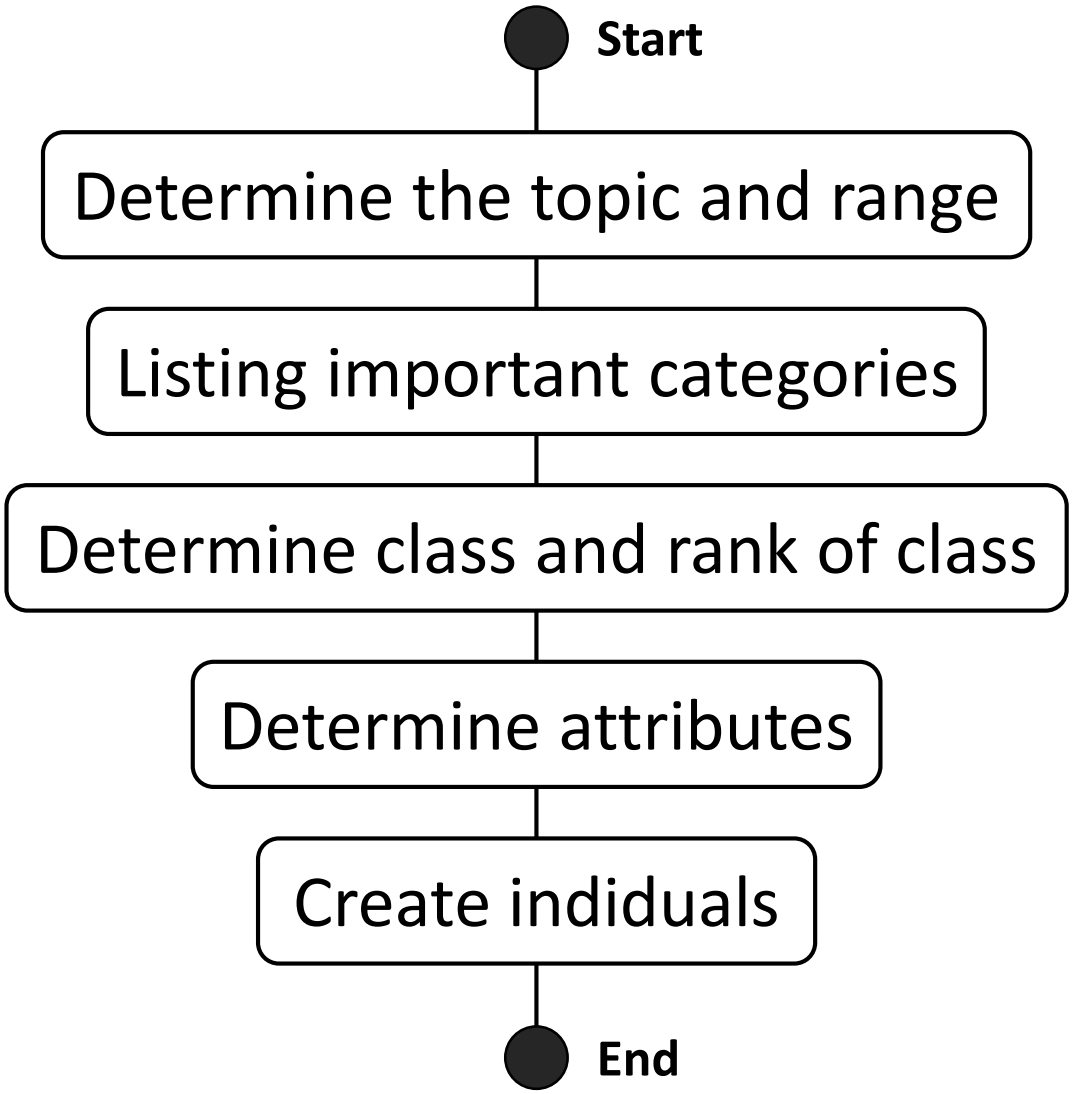
Individuals: Instances or objects. *Eg: Exam*

Classes: Sets, collections, concepts. *Eg: Study*

Attributes: Aspects, properties, features, characteristics or parameters that objects (and classes) can have.

Relations: Ways in which classes and individuals can be related to one another

Build an Ontology



Questions Answering

Definition:

Questions Answering is a computer science discipline within the fields of information retrieval and natural language processing (NLP), which is concerned with building systems that automatically answer questions posed by humans in a natural language

Demo

Prepare data:

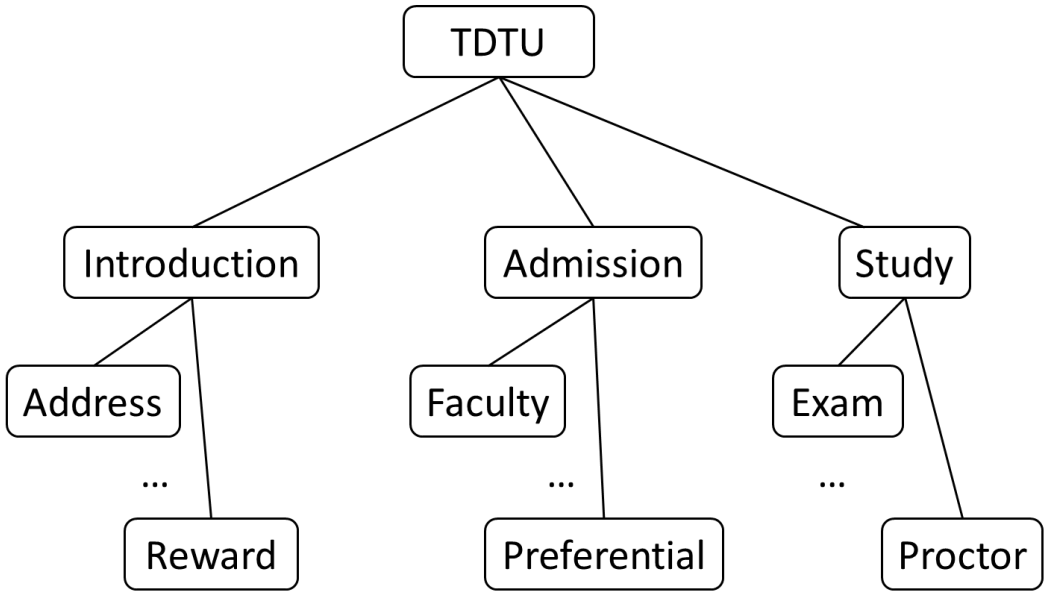
Data: There are about 2500 questions and its answer

Preprocessing: All question are get its feature by 3 step:

- **Reject**: In this step, all the non-Vietnamese words in question are reject.
- **Tokenize**: using pyvi to tokenize question, get its feature.
- **Clear Stopwords:** replace all stopword to keep data clean.

Demo

Use python to construct the definition of class. Each class has a name, child node list, and feature. The feature of a node consists of features of all child nodes.



Demo - Pseudocode

```
def build_feature(Node, path):
    '''
    :param Node: current Node on tree
    :param path: current path to
    :return: path to folder save content
    '''
    if Node.get_child() == None:
            return extract_feature(path)

    feature = [[]]
    for child in Node.get_child():
        child.set_feature(build_feature(child, path
                          + '\\' + child.get_name()))
        feature = append_feature(feature,
                                 child.get_feature(), 1)

    Node.set_feature(feature)
    return Node.get_feature()
```

Demo - Pseudocode

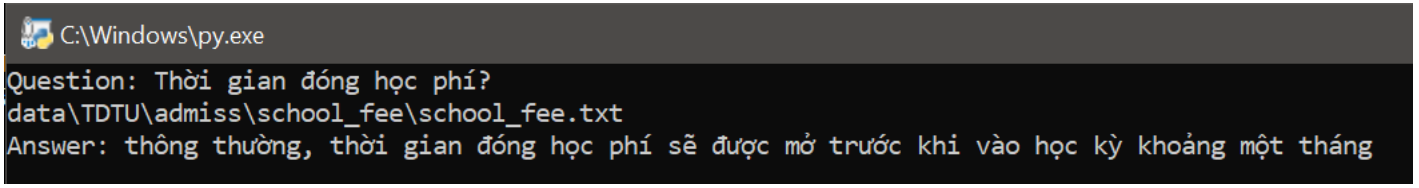
```
def intend(ques, Node, path):
    '''
    :param ques: question of user put in
    :param Node: current Node on tree
    :param path: current path to
    :return: path to folder save content
    '''
    if Node.get_child() == None:
            return path

    # Select new node to forward
    choose = KNN(ques, Node)
    return intend(ques, choose, path + '\\' +
                                    choose.get_name())
```

Demo - Testing

Enter your question into typing place

Then type the enter button to get the answer.



First line: Display your answer.
Second line: Show the path to the content stored.
Third line: The answer to your question.

Sumary

Ontology is nearly our hierarchical system, which easily represents object properties and relations.

Nowadays, ontology is using in many research or around our life (eg: Wikipedia).

Question answering is using Ontology as knowledge-base because of its versatility and simple.

References

[1]_Wikipedia > Question_answering

[2]_Wikipedia > Ontology_(information_science)


Thanks!