RESOURCE DISCOVERY USING AUTONOMIC COMPUTING

5/20/2011

Muhammad Usman Akram & Shehzad Khurram

Pervasive Computing

Introduction

- Highly dynamic & distributed environments
- Demand context awareness
- Resources & Users are dynamic & needed to be discovered
- User attention for management & configuration asks should be minimum

Ontology

Introduction

- Defined as a formal representation of knowledge as a set of concepts within a domain with relationships between these concepts
- The term originates from philosophy (the study of the nature of being as well as categories of being and their relations)

Semantics

Introduction

- The term comes from the word “semantic”
  - The study of meaning
- Important in pervasive computing
  - Gives machines the ability to understand the meaning of information on the internet

Autonomic Computing

Introduction

- Fuzzy & Rough Set Theories
- AC/CBR

Later

Our Project

Concept

- Resource Management
  - Resource Discovery
    - Finding Resources based on some semantics'
  - Adding new resources
  - Removing resources
- Using Autonomic Computing

Ontology

Realization

- Using ***protégé***
- Ontology based on Movies
- Attributes
  - Movie ID
  - Title
  - Ratings
  - Recommendation
  - Genre

Ontology Relationships

Concept

- Movie has_Rating Rating
- Movie has_Recommendation Recommendation
- Movie has_Title Title
- Movie of_Genre Genre
- Movie released_in_Year Year

Autonomic Computing

Introduction

- Bio-Inspired self managing systems
- Implemented using “Case Based Reasoning”
  - Using 4 cycle CBR
    - Retrieve
    - Reuse
    - Revise
    - Retain

Fuzzy & Rough Set Theory

Introduction

- Should we incorporate some real world uncertainties ?
- Used to represent vagueness & uncertainties of concepts

Our project

Concept

- Using CBR for inference
  - Making cases as represented by ontology
  - Defining distance / similarity measure based upon ontology
- Knowledge acquisition
  - Updating case base

Case Based Reasoning

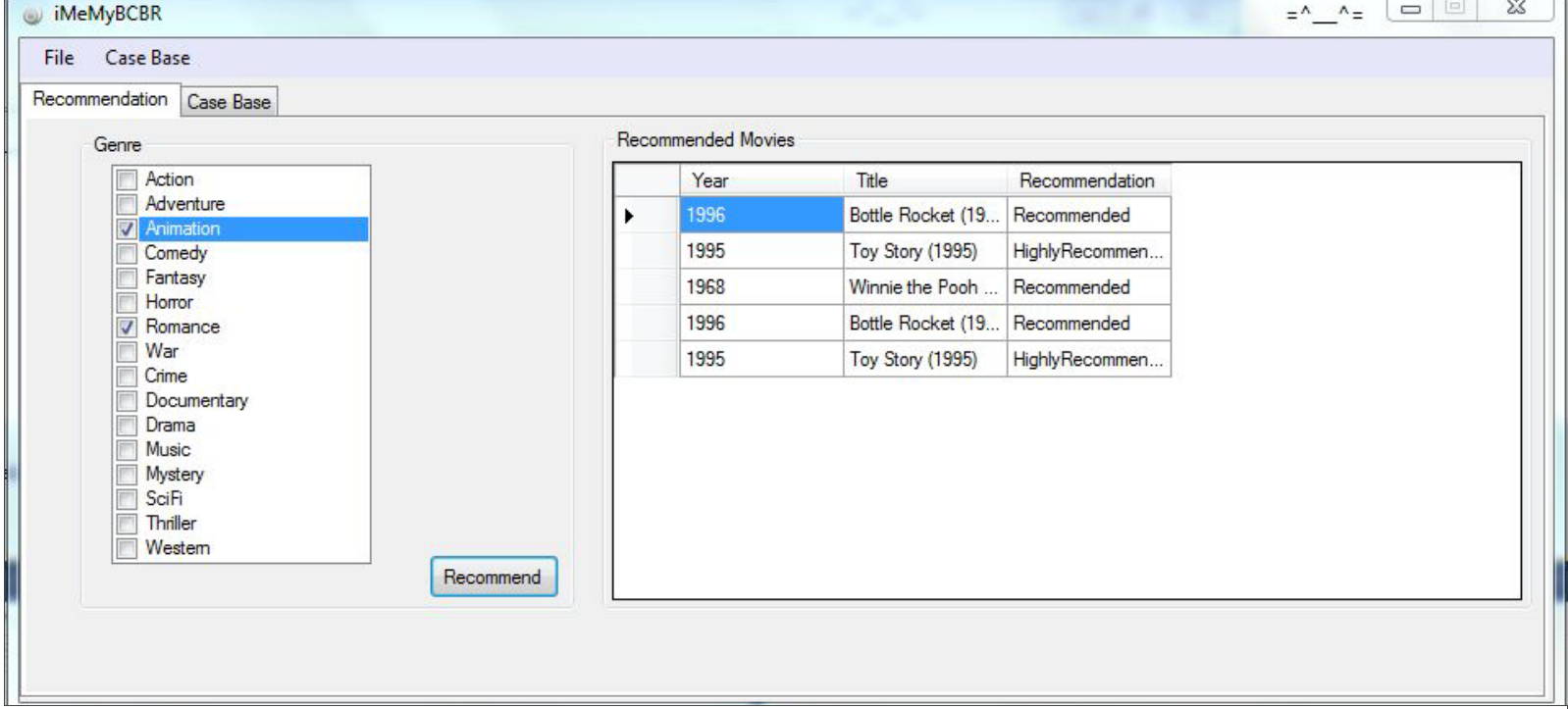
Realization

- Using available moviedb
- JColibri
  - Completely based on owl ontology
    - Data acquisition should be performed in *protégé*
    - *Concept Movie as case*

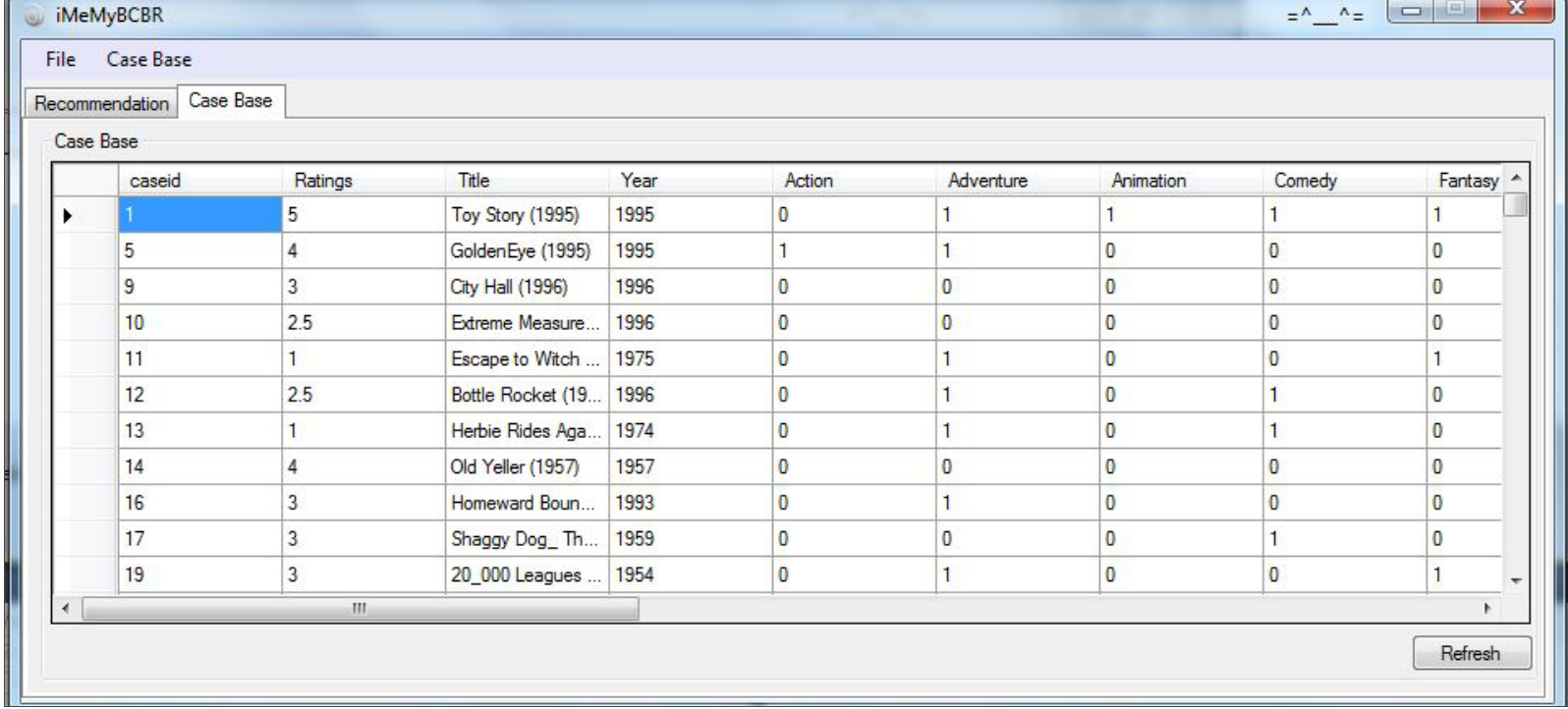
Case Based Reasoning

Realization

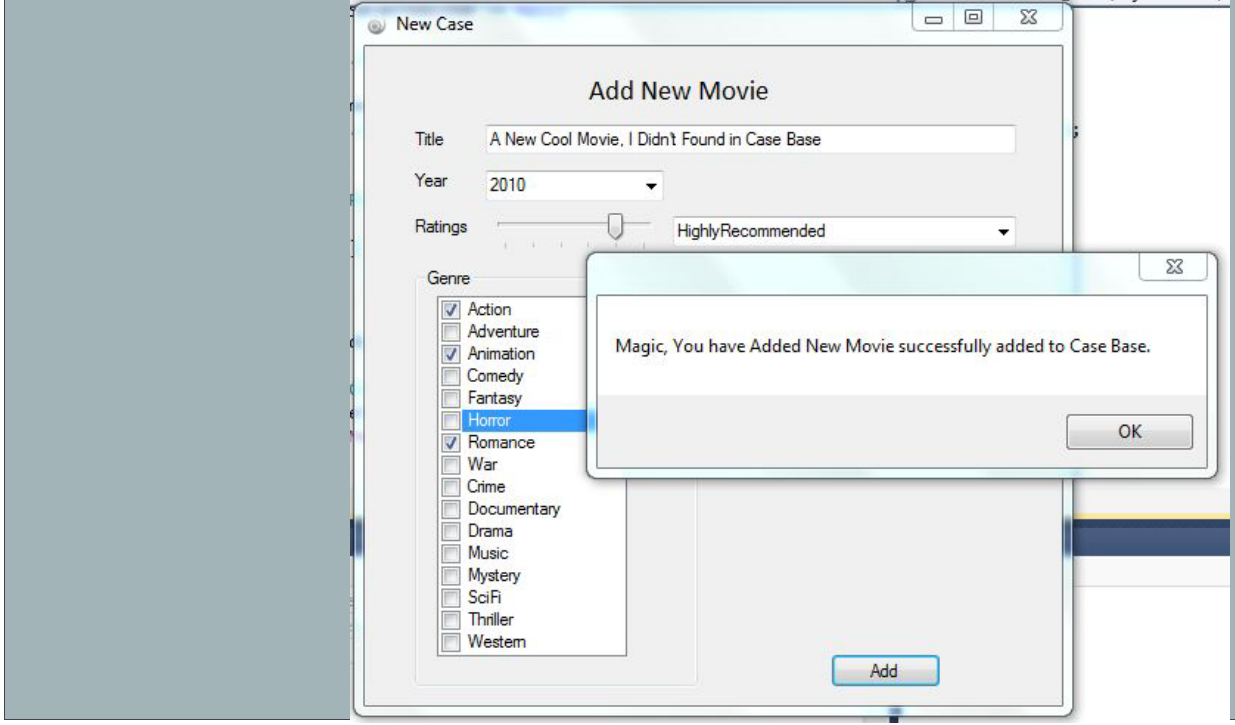
- iMeMyCBR
  - Customized CBR implementation
  - Data Acquisition using database & online
  - CBR Cycle
    - Case Retrieval [from db]
    - Case Reuse [for calculation recommended resources]
    - Case Update [currently, only new addition]


iMeMyBCBR
=^__^=
File
Case Base
Recommendation
Case Base
Genre
Action
Adventure
Animation
Comedy
Fantasy
Horror
Romance
War
Crime
Documentary
Drama
Music
Mystery
SciFi
Thriller
Western
Recommend
Recommended Movies
Year
Title
Recommendation
1996
Bottle Rocket (19...
Recommended
1995
Toy Story (1995)
HighlyRecommen...
1968
Winnie the Pooh ...
Recommended
1996
Bottle Rocket (19...
Recommended
1995
Toy Story (1995)
HighlyRecommen...

Demo


iMeMyBCBR
=^__^=
File
Case Base
Recommendation
Case Base
Case Base
caseid Ratings Title Year Action Adventure Animation Comedy Fantasy
1 5 Toy Story (1995) 1995 0 1 1 1 1
5 4 GoldenEye (1995) 1995 1 1 0 0 0
9 3 City Hall (1996) 1996 0 0 0 0 0
10 2.5 Extreme Measure... 1996 0 0 0 0 0
11 1 Escape to Witch ... 1975 0 1 0 0 1
12 2.5 Bottle Rocket (19... 1996 0 1 0 1 0
13 1 Herbie Rides Aga... 1974 0 1 0 1 0
14 4 Old Yeller (1957) 1957 0 0 0 0 0
16 3 Homeward Boun... 1993 0 1 0 0 0
17 3 Shaggy Dog_ Th... 1959 0 0 0 1 0
19 3 20_000 Leagues ... 1954 0 1 0 0 1
Refresh

Demo


New Case
Add New Movie
Title
A New Cool Movie, I Didn't Found in Case Base
Year
2010
Ratings
HighlyRecommended
Genre
Action
Adventure
Animation
Comedy
Fantasy
Horror
Romance
War
Crime
Documentary
Drama
Music
Mystery
SciFi
Thriller
Western
Add
Magic, You have Added New Movie successfully added to Case Base.
OK

Demo

Used hardware/software

Realization

- Hardware:
  - HP Pavilion Laptop running Microsoft Windows 7
- Software:
  - Protégé (version 3.4.4)
  - JColibri
  - iMeMyCBR

Problems Faced ☹

Problems

- Building rough set ontology's & inference
- Obtaining well formed movie database
- Importing complete db to movie ontology
- Discovering semantics from introduction of movies