Viterbi Semantic Guide

Presenters:
Anamika Mukherji
Lohith Ram
Shubham Sharma
Varad Pathak

Goal
To create a Curriculum and Research Guide for the USC Viterbi School of Engineering

Data Modeling and RDF Generation
Karnak: A tool created by Information Integration group at ISI
- We have used this tool for data modeling and RDF generation
- Imported both. Ontology created in Protégé and corresponding Data in Excel file
- Mapped the ontology Classes with corresponding columns and mapped the relations between those columns

Ontology Merging
- All the department classes were mapped as subclasses of target classes
- Created and data presented. All classes and their properties were mapped as subclasses of logical properties
- New classes were added from the merged files using Describe Logic Reasoner plugin

Ontology Creation
- Use of Ontology
- Use of Logic Reasoner plug-in

Data Collection and Data Cleaning
- Used Google Chrome Extension called Scraper for scraping
- Scraped data for each of the department from their corresponding websites
- Stored scraped data in an Excel file
- After completing data collection, we performed some data cleaning
- Cleaned some data related to home economic heterogeneity and formatting

Thank You
Goal

To create a Curriculum and Research Guide for the USC Viterbi School of Engineering
Scope

Departments
- Computer Science
- Electrical Engineering
- Civil Engineering

Areas
- Courses
- Faculty
- Ph.D. Students
- Postdoc Students
- Research institutes, Labs and groups
Data Collection and Data Cleaning

- Used Google Chrome Extension called Scraper for scraping.
- Scraped data for each of the department from their corresponding websites.
- Stored Scraped data in an Excel file.
- After complete data collection, We performed some data cleaning.
- Cleaned some data related to name scemantic heterogenity and formatting.
Ontology Creation

Top-Down vs Bottom-up

**Top-Down:** Create a single standardized ontology (Top Level - Viterbi) first and then ask individual entities to create their own local/private ontologies which follow standard ontology.

**Bottom-up:** Let individual private parties create their ontologies (Departments) and then create Top-level ontology (Viterbi) which has all the required classes and properties.

**Protege:** We used Protege to create ontologies and merge them. We have also used its "Hermit Reasoner" to draw new inferences.

SPARQL Queries in Protege
Ontology Merging

**Classes:** All the department classes were mapped as sub-classes of Top-level classes.

**Object and Data Properties:** All Object and Data properties were mapped as sub-properties of Top-level properties.

**Inferences:** New inferences were drawn from the merged Data using Description Logic Reasoner Hermit.
Data Modeling and RDF Generation

Karma: A tool created by Information Integration group at ISI
- We have used this tool for data modeling and RDF generation
- Imported both, Ontology created in Protege and corresponding Data in Excel file
- Mapped the ontology Classes with corresponding columns and mapped the relations between those columns
PREFIX viterbi: <http://www.viterbi.edu#>

SELECT (str(?Advisor) as ?Advisor) (str(?Student) as ?Student) ?EmailOfStudent
WHERE {
  ?faculty viterbi:advisorOf ?student;
      viterbi:name ?Advisor.
  FILTER (str(?Advisor) = "Dennis McLeod").
  ?student viterbi:name ?Student;
      viterbi:mbox ?EmailOfStudent.
}
ORDER BY ?Student
Sparql Query 2

Filter by no. of Units of Course

PREFIX viterbi: <http://www.viterbi.edu#>

SELECT (str(?id) as ?CourseID) (str(?name) as ?Course) (str(?InstructorName) as ?Instructor) ?Prerequisite ?Corequisite ?units
WHERE {
    ?subject a viterbi:course;
    viterbi:id ?id;
    viterbi:units ?units;
    viterbi:name ?name.
    OPTIONAL {?subject viterbi:prerequisite ?Prerequisite}
    OPTIONAL {?subject viterbi:corequisite ?Corequisite}
    OPTIONAL {?subject viterbi:instructor ?instr.
    ?instr viterbi:name ?InstructorName. }
    FILTER(?units>3 || ?units<3)
} ORDER BY DESC(?units) ?subject
PREFIX viterbi: <http://www.viterbi.edu#>
PREFIX fn: <http://www.w3.org/2005/xpath-functions#>

SELECT (str(?ResearchArea) as ?Work) (str(?Faculty) as ?Researcher) (str(?Phone) as ?Phone) (str(?Office) as ?Office)
WHERE {
    ?subject a viterbi:faculty;
    viterbi:researchFocus ?Research.
    ?subject viterbi:name ?Faculty;
    viterbi:phone ?Phone;
    FILTER (str(fn:lower-case(?ResearchArea)) = "machine learning").
} ORDER BY ?Researcher
Query 4

Research Institutes

PREFIX viterbi: <http://www.viterbi.edu#>
PREFIX fn: <http://www.w3.org/2005/xpath-functions#>

SELECT (str(?Name) as ?Name) (str(?WebPage) as ?URL)
WHERE {
  ?subject a viterbi:organization;
  viterbi:name ?Name;
} ORDER BY ?subject
Thank You