



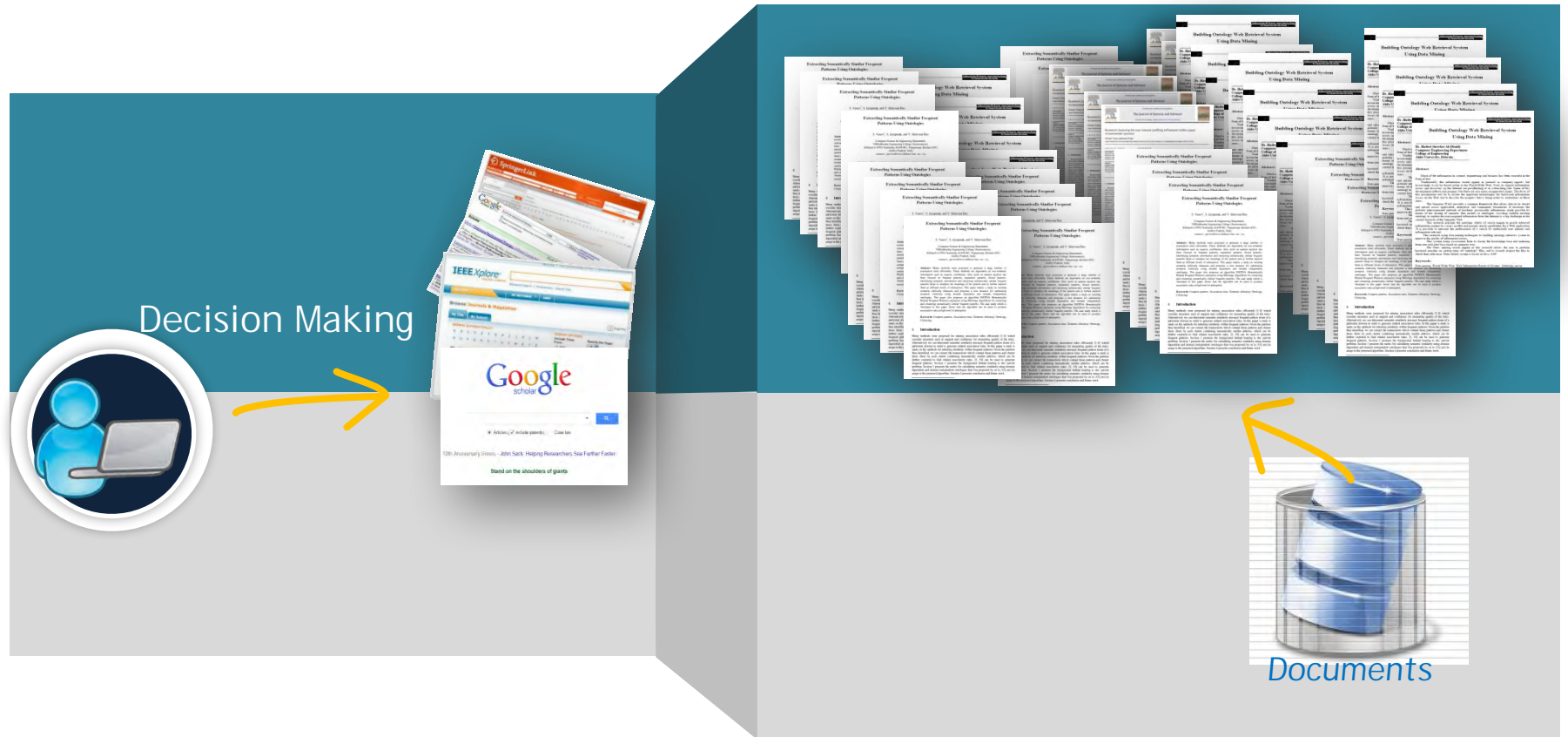
Algorithm for Information Visualization of Semantic Search Using Computer Science Research Ontology



Assoc. Prof. Dr. Anirach Mingkhwan

King Mongkut's University of Technology North Bangkok
(KMUTNB), Thailand.

Keyword Based Search



Traditional Keyword-based Matching

Keyword Based Search Limit

01

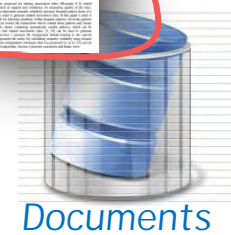
Keyword based search

Just Keyword

✗Synonym

✗Hyponym

Decision Support Making
Decision Support
Decision Making



“Information Overload”

Keyword Based Search Limit

01

Keyword based search

Results Example



“Information Overload”

Scopus

Search 180,667 document results

TITLE-ABS-KEY (decision making) AND PUBYEAR > 2009 AND PUBYEAR < 2015

180,667 document results

Search within results...

Refine

Year

Year	Count
<input type="checkbox"/> 2014	(37,638)
<input type="checkbox"/> 2013	(38,262)
<input type="checkbox"/> 2012	(36,959)
<input type="checkbox"/> 2011	(34,560)
<input type="checkbox"/> 2010	(33,248)

Author Name

<input type="checkbox"/> Xu, Z.	(117)
<input type="checkbox"/> Tzeng, G.H.	(117)
<input type="checkbox"/> Huang, G.H.	(98)
<input type="checkbox"/> Legare, F.	(84)
<input type="checkbox"/> Dolan, R.J.	(80)

Year: 2010 - 2014

Decision framework of solar thermal power plant site selection based on linguistic Choquet operator

Run watchers: Auto

Towards informed decisions on breast cancer screening: Development and pilot testing of a decision aid for Chinese women

Bridging the gap between researchers and decision-makers (Book Chapter)

Negotiating Capacity and Consent in Substance Misuse (Book Chapter)

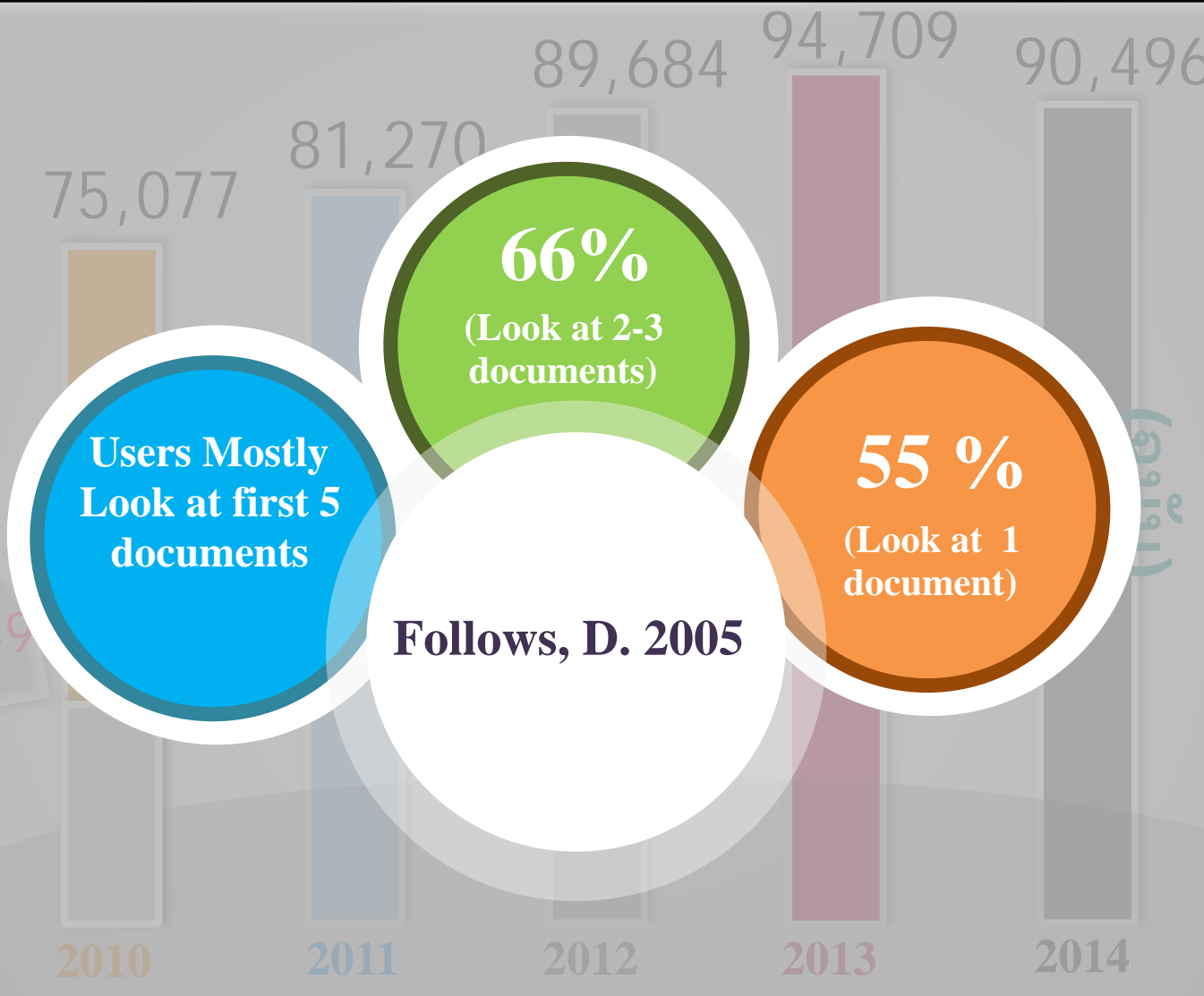
Wu, Y., Geng, S., Zhang, H., Gao, M.

Konev, A., Waser, J., Sadransky, B., (...), Horváth, Z., Gröller, M.E.

Wong, I.O.L., Lam, W.W.T., Wong, C.N., (...), Leung, G.M., Fielding, R.

Verdon-Kidd, D.C., Kiem, A.S., Austin, E.K.

Samsi, K.

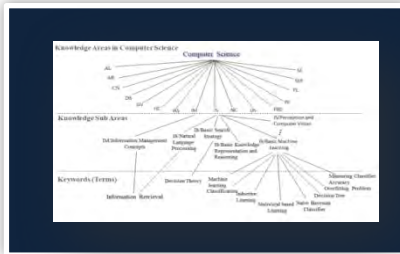


Keyword Based Search Limit

01

Keyword based search

Propose Solutions



Computer Science Ontology

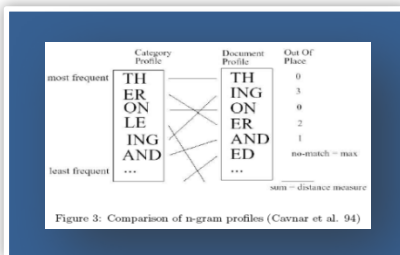


Figure 3: Comparison of n-gram profiles (Cavnar et al. 94)

N-grams

Semantic Ranking

Keyword Based Search Limit

02

Query and Answering

The screenshot shows a Google Scholar search for 'decision making'. The search bar at the top contains the text 'decision making' and a search icon. Below the search bar, it indicates 'Ungefähr 2.120.000 Ergebnisse (0,04 Sek.)'. The results are listed in a table-like format with filters on the left. The filters include 'Bellebige Zeit' (with sub-options for 'Seit 2019', 'Seit 2018', 'Seit 2015', and 'Zeitraum wählen...'), 'Nach Relevanz sortieren', 'Nach Datum sortieren', 'Bellebige Sprache' (with sub-option 'Seiten auf Deutsch'), 'Patente einschließen', 'Zitate einschließen', and 'Alert erstellen'. The search results list three articles:

- [RUCH] Decision making: A psychological analysis of conflict, choice, and commitment.**
IL Janis, L Mann - 1977 - psycnet.apa.org
Presents a general descriptive theory of **decision making** under stress, which includes a typology of 5 distinctive patterns of coping behavior, including vigilance, hypervigilance, and defensive avoidance. The theory is illustrated with discussions of laboratory experiments ...
☆ ⓘ Zitiert von: 8360 Ähnliche Artikel Alle 3 Versionen ⓘ
- Judgment in managerial decision making**
M Bazerman, DA Moore - 2013 - hbs.edu
Is your judgment influenced by personal biases? In situations requiring careful judgment, we're all influenced by our own biases to some extent. But, with Judgment in Managerial **Decision Making**, you can learn how to overcome those biases to make better managerial ...
☆ ⓘ Zitiert von: 4112 Ähnliche Artikel Alle 4 Versionen ⓘ
- Decision-making in a fuzzy environment**
RE Bellman, LA Zadeh - Management science, 1970 - pubsonline.informs.org
By **decision-making** in a fuzzy environment is meant a **decision** process in which the goals and/or the constraints, but not necessarily the system under control, are fuzzy in nature. This means that the goals and/or the constraints constitute classes of alternatives whose ...
☆ ⓘ Zitiert von: 9213 Ähnliche Artikel Alle 22 Versionen Web of Science: 1502 ⓘ

Additional links are provided for each article: '[PDF] informs.org Full View' for the first article, and '[PDF] utdallas.edu' for the second article.

Keyword Based Search Limit

02

Query and
Answering

Questions:

- 1) What area of Computer Sciences most active in USA year 2008.
- 2) This document related to what area in Computer Sciences.
- 3) Which Country are the most active in "Data Mining".

Keyword Based Search Limit

02
Query and Answering

Propose **Solutions**

Research Paper

Title

Author

Country

Abstract

Keyword

Date

Date 2013 IEEE International Conference on Fuzzy Systems
SINFZ'13, 2013, Taipei, Taiwan

Title Developing a Fuzzy Search Engine Based on Fuzzy Ontology and Semantic Search

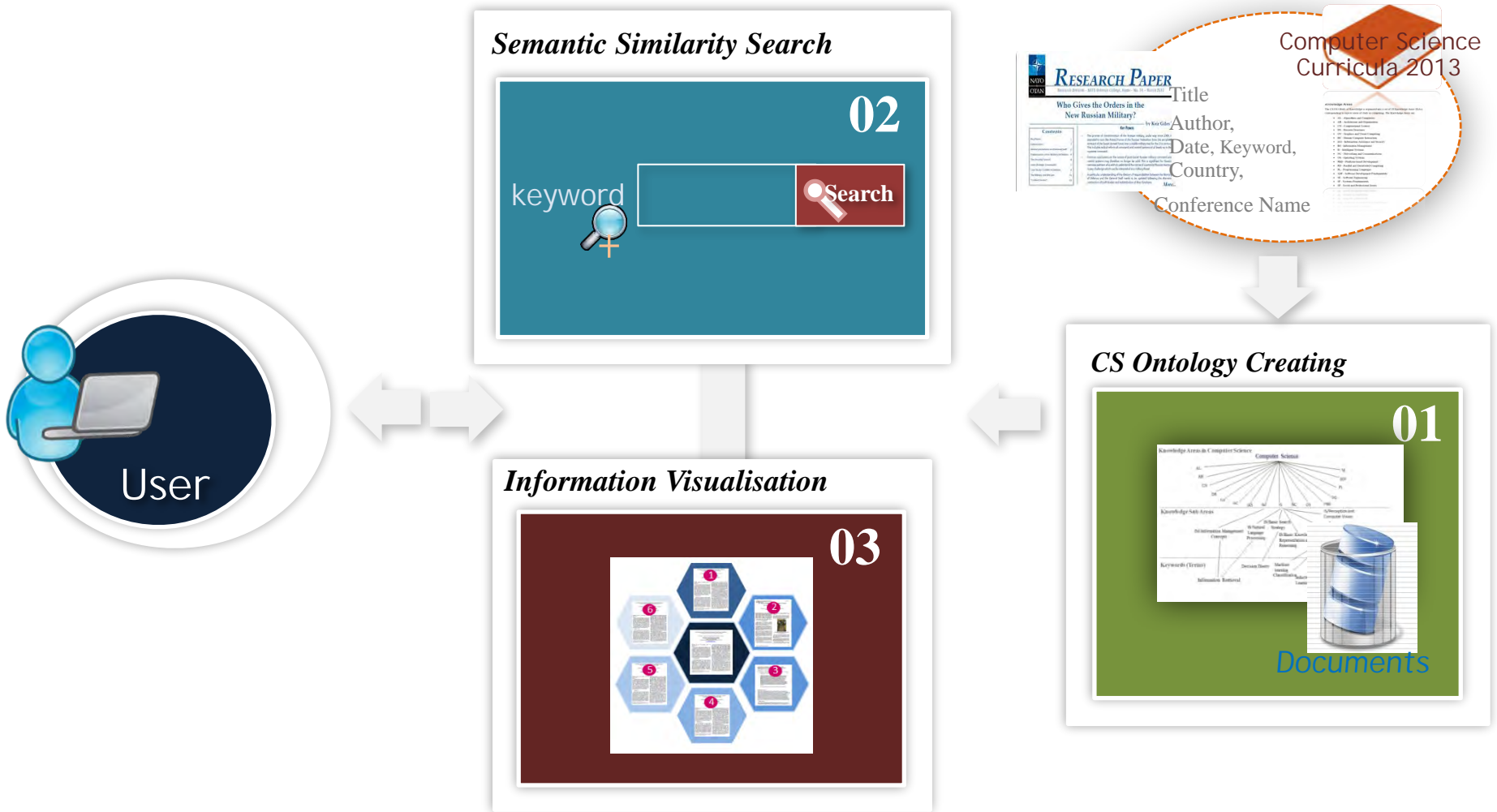
Author Lin-Fu Lai, Chao-Chin Wu, Pei-Ying Lin
Dept. of Computer Science and Information Engineering
National Changhua University of Education
Changhua, R.O.C.

Affiliation

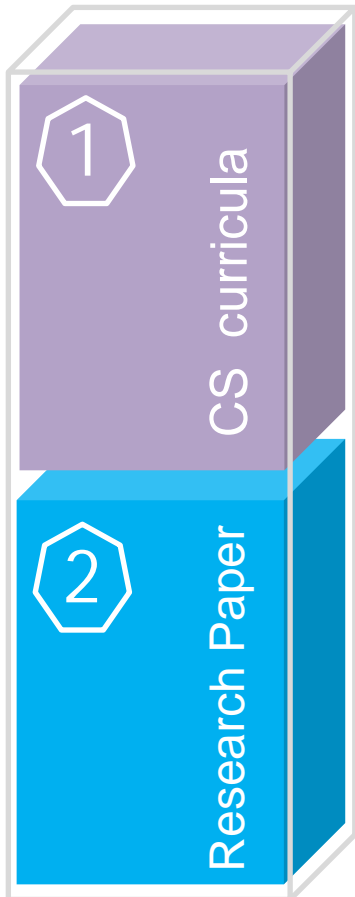
Abstract

Keywords Fuzzy Search Engine; Fuzzy Ontology; Semantic Search

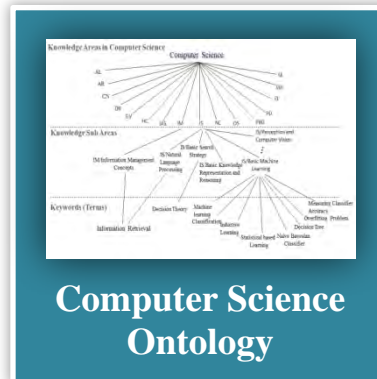
The Framework of Semantic Search



Research Database



Computer science curricula 2013 report (IEEE&ACM)



1800 documents (2008-2012)

Date: 2011 IEEE International Conference on Fuzzy Systems, 2011, Taipei, Taiwan

Title: Developing a Fuzzy Search Engine Based on Fuzzy Ontology and Semantic Search

Author: Lien-Fu Lai, Chao-Chin Wu, Pei-Ying Lin

Country: National Chung-Hua University of Education, Chunghua, R.O.C.

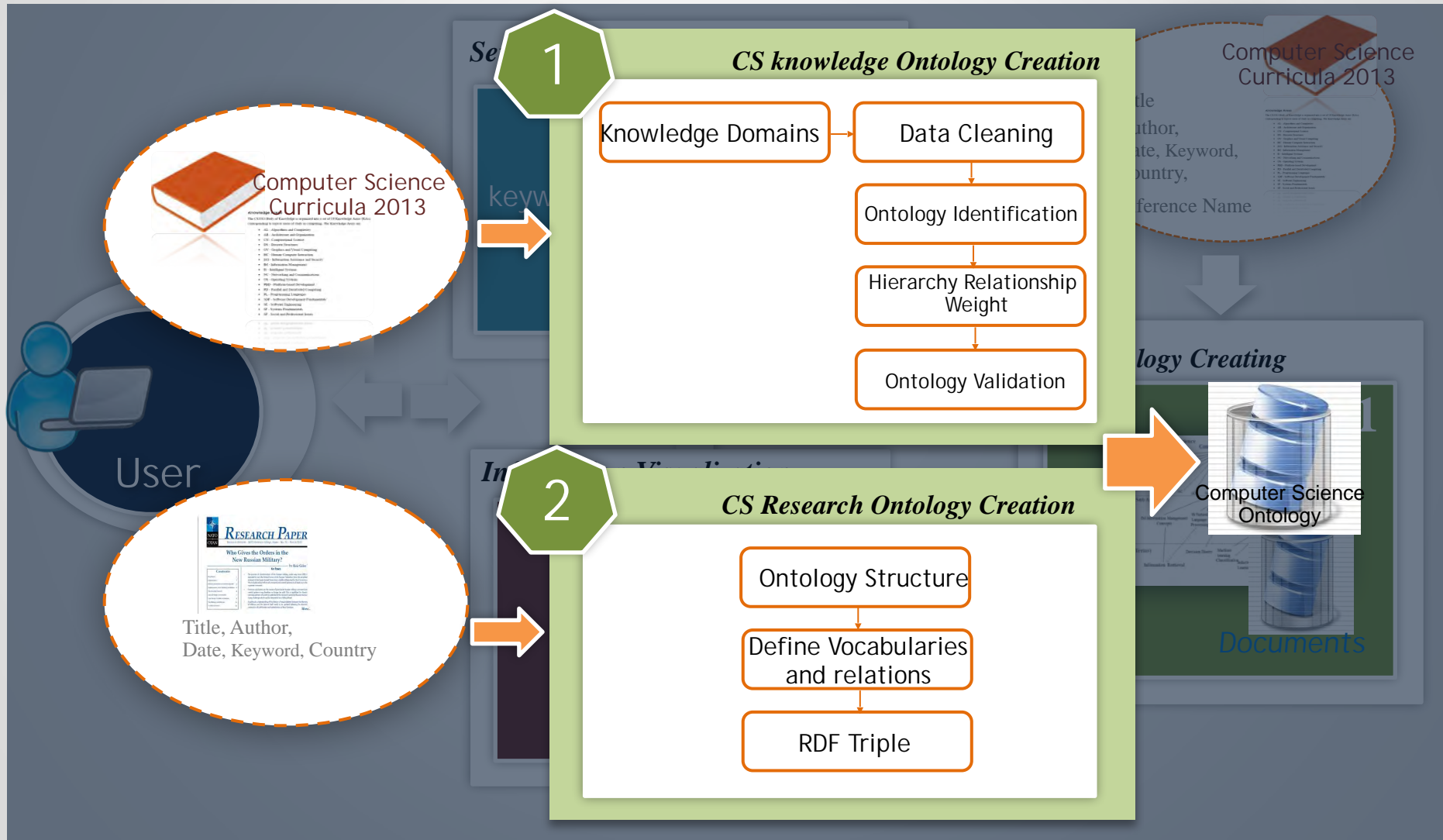
Abstract: Most of existing search engines retrieve web pages by means of finding exact keywords. Traditional keyword-based search engines suffer several problems. First, synonym and terms similar to keywords are not taken into consideration to search web pages. Users may need to input several similar keywords individually to complete a search. Second, traditional search engines treat all keywords as the same importance and cannot differentiate the importance of one keyword from that of another. Third, traditional search engines lack an applicable classification mechanism to reduce the search space and improve the search results. In this paper, we develop a fuzzy search engine, called Fuzzy-GO. First, a fuzzy ontology is constructed by using fuzzy logic to capture the similarities of terms in the ontology, which offering appropriate semantic distances between terms to accomplish the semantic search of keywords. The Fuzzy-GO search engine can thus automatically retrieve web pages that contain synonyms or terms similar to keywords. Second, users can input multiple keywords with different degrees of importance based on their needs. The search satisfactory degree of keywords can be aggregated based on their degrees of importance and degree of satisfaction. Third, the domain classification of web pages offers users to select the appropriate domain for searching web pages, which excludes web pages in the inappropriate domain to reduce the search space and to improve the search results.

Keywords: Fuzzy Search Engine; Fuzzy Ontology; Semantic Search



Documents

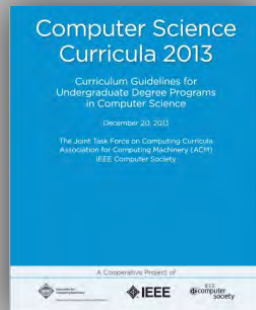
01 Cs Ontology Creating



01 Cs Ontology Creating (*CS knowledge Ontology Creation*)

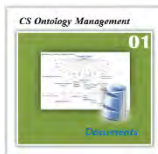
1

Computer
Science
Knowledge
Domain



(Computer science curricula 2013 report)

(*Endorsed by Association for Computing Machinery (ACM) and IEEE Computer Society*)



Computer Science

Architecture and Organization

Discrete Structure

Human-Computer Interaction

Information Management

Networking and Communication

Platform-based Development

Programming Language

Software Engineering

Social and Professional Issue

Algorithms and Complexity

Computational Science

Graphics and Visual Computing

Information Assurance
and Security

Intelligent System

Operating System

Parallel and Distributed
Computing

Software Development

Systems Fundamental

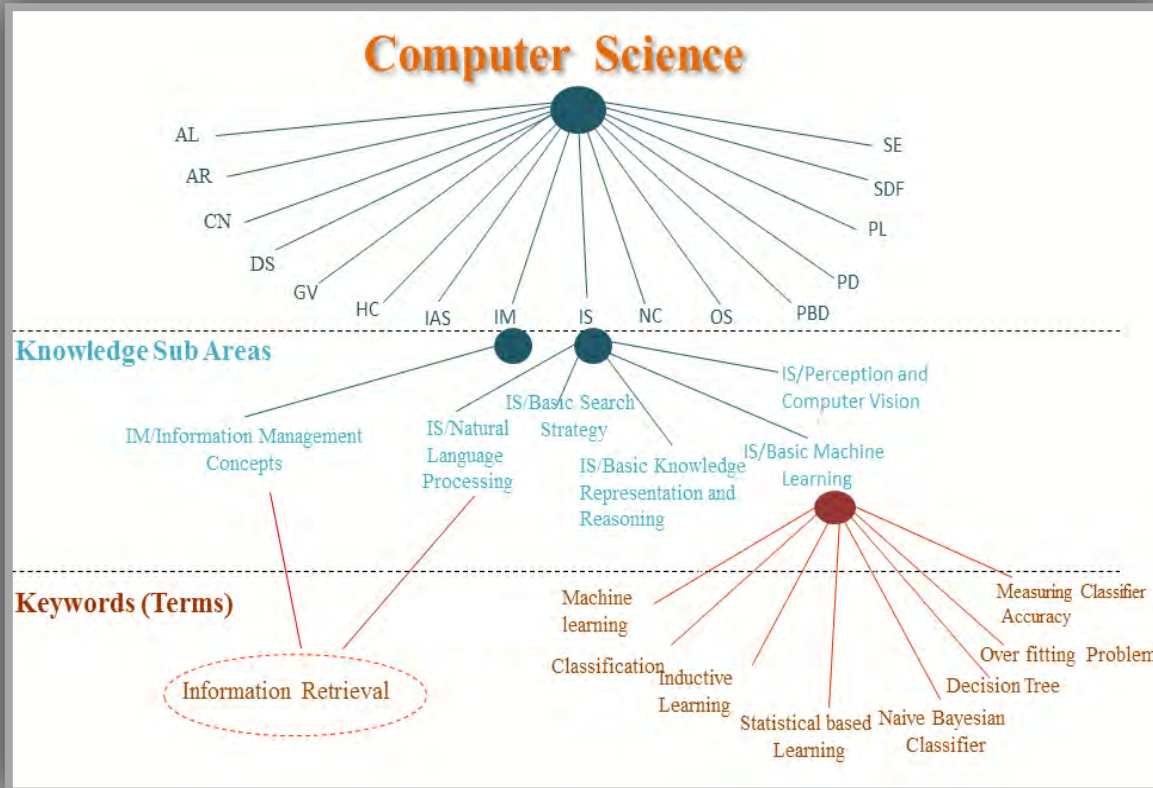
Figure : Knowledge Area of Computer Science

Ref : <http://ai.stanford.edu/users/sahami/CS2013/>

01 Computer Science Ontology Creating

2

Taxonomic hierarchy & Weight



18 Taxonomies

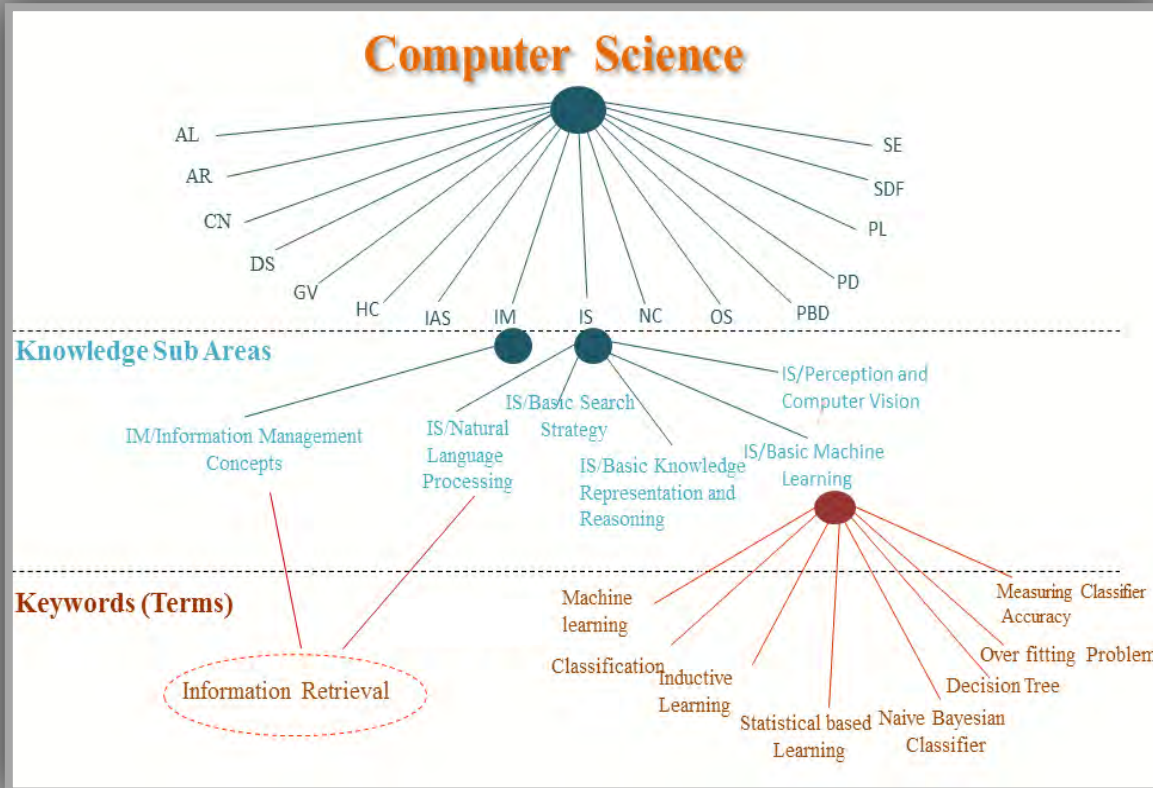
The taxonomic hierarchy of Computer Science



01 Computer Science Ontology Creating

2

Taxonomic hierarchy & Weight



155 Terms

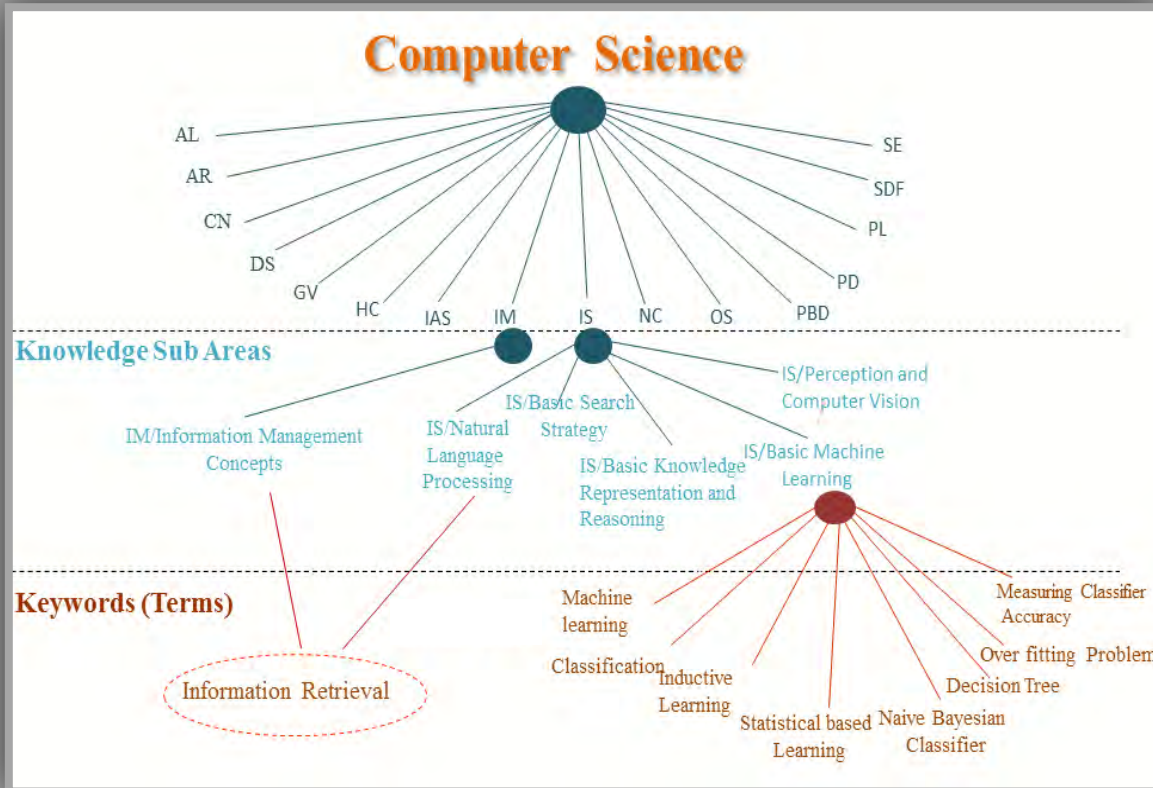
The taxonomic hierarchy of Computer Science



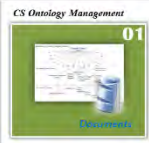
01 Computer Science Ontology Creating

2

Taxonomic hierarchy & Weight



The taxonomic hierarchy of Computer Science



01 Computer Science Ontology Creating

2

Taxonomic
hierarchy
&
Weight

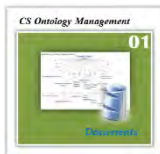
Similarity Measure (Edge Counting)

$$sim_{w\&p}(a,b) = \frac{2 \times N_3}{N_1 + N_1 + 2 \times N_3}$$

(Wu, Z. and Palmer, Edge Counting Measure, 1994.)

Weight of the ontology relation table

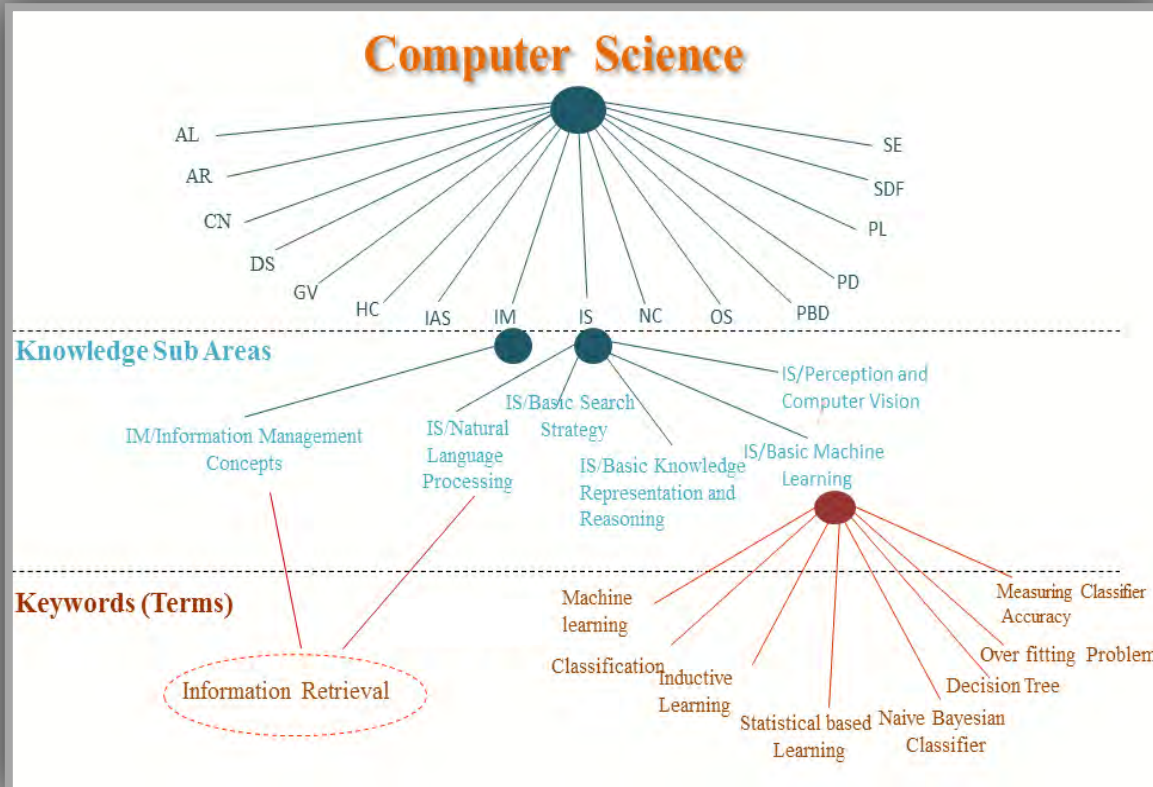
Relationship Type	Weight
Repetition / Synonymy	1
Same Sub Area	0.75
Same Area	0.5
different area	0.25
not found In CS ontology	0



01 Computer Science Ontology Creating

2

Taxonomic hierarchy & Weight



0.25

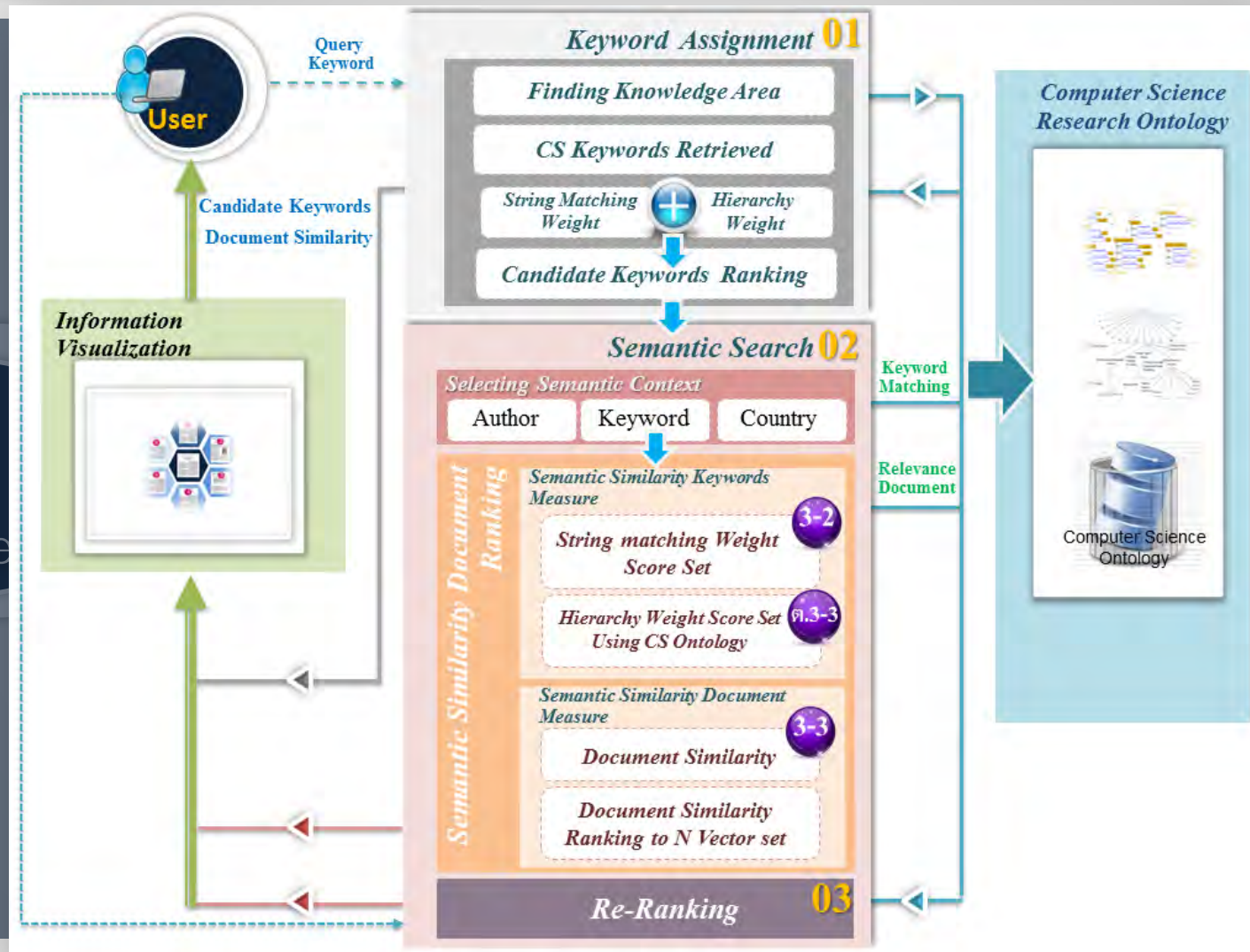
0.5

0.75

The taxonomic hierarchy of Computer Science



The Framework of Semantic Search (02 Semantic Similarity Search)



Computer Science Curricula 2013
 Semantic Similarity Search Process
 01
 01
 Documents

02 Semantic Similarity Search (Keyword Semantic Similarity)

1) String Matching Weight Measure

Semantic Annotation of Text Documents Using Modified Probabilistic Neural Network

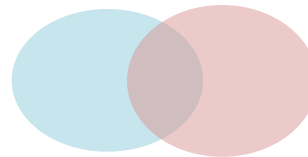
Medical Decision Making

Electrical Network

Improved Genetic Algorithm

Heuristic Evaluation

Document Keywords



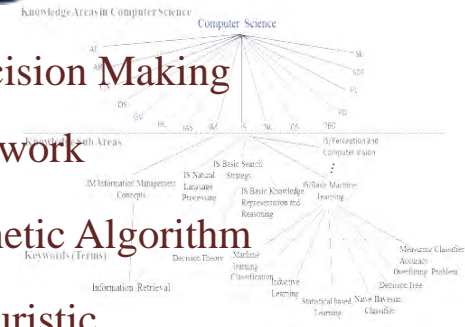
Decision Making

Network

Genetic Algorithm

Heuristic

Ontology Keywords
(Computer Science Ontology)



N-grams
(Trigrams)

M *Me Med edi dic ica cal al * I

D *De Dec cis isi sio ion on* n

M *Ma Mak aki kin ing ng* g

Grams Grzegorz Kondrak formulates a family of word similarity measures based on N-grams.

$$\frac{2x|n\text{-Keyword}(QW) \cap n\text{-Keyword}(OW)|}{|n\text{-Keyword}(QW)| + |n\text{-Keyword}(OW)|}$$

Ref : (Grzegorz Kondrak, 2005)



02 Semantic Similarity Search (Keyword Semantic Similarity)

2) Hierarchical Relationship Weights

Relationship Type	Weight
Repetition /Synonymy	1
same sub area	0.75
same area	0.5
different area	0.25
not found In CS ontology	0

For Example

Repetition /Synonymy
Database, DB → 1
Information Retrieval, IR
Entity-Relationship, E-R

02 Semantic Similarity Search (Calculating Document Similarity Score)

Steps

Calculating Document Keywords Score

Calculate Document Similarity Score

Calculating Document Similarity Score

- ➔ (a) Calculate N-grams Weight Set of Similarity between Query Keyword with Ontology Keyword.
- (b) Calculate Weight Set of Semantic Similarity between Query Keyword with Ontology Keyword

$$SWK_{d,i}(QK,DK) = SWK_{n\text{-gram}} + SWK_{cs\text{-onto}}$$

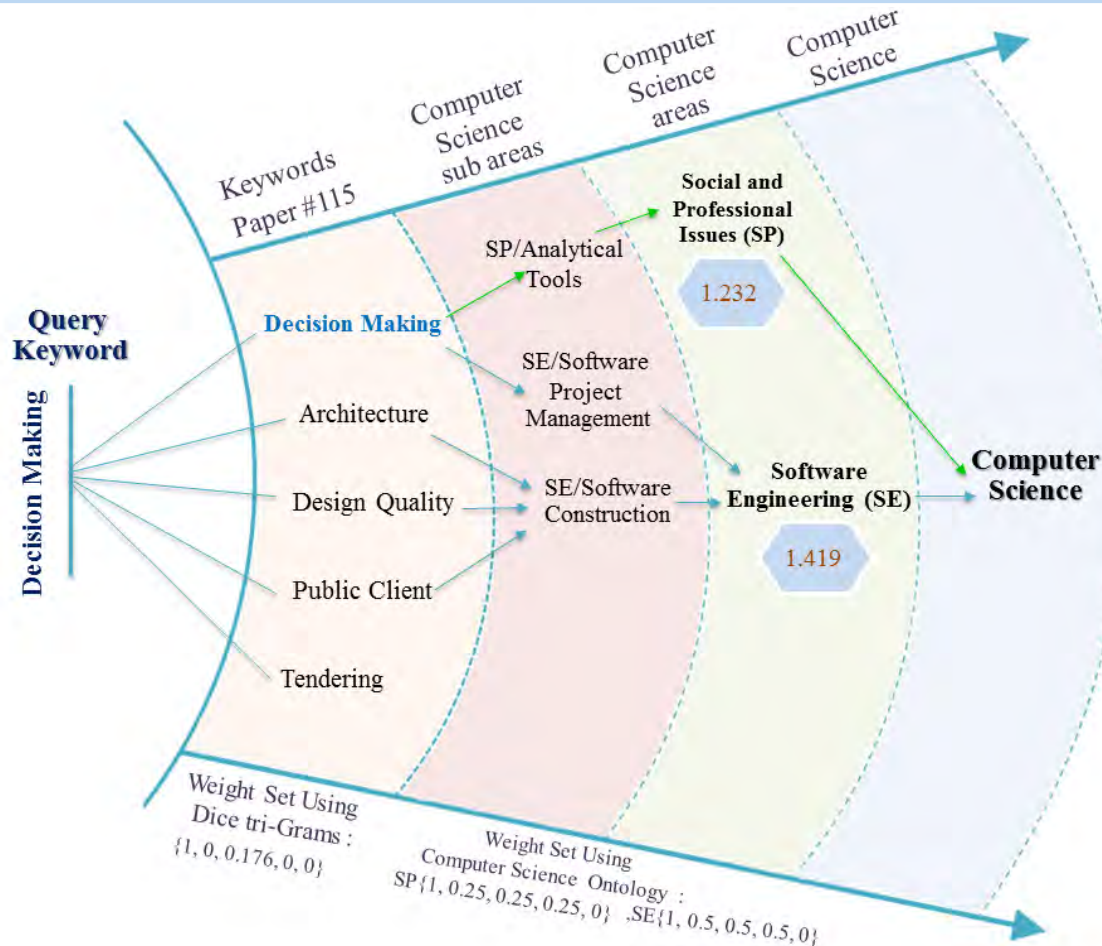
- $SWK_{d,i}(QK,DK)$: the total Semantic Weight Keyword (SWK)
- $SWK_{n\text{-gram}}$: semantic weight keyword each document based on N-grams
- $SWK_{cs\text{-onto}}$: semantic weight keyword each document based on Computer Science ontology

$$DSS(D_d, q) = \begin{cases} 1 + \frac{\sum_{i=1}^N SWK_{d,i}}{N-1} & ; \text{One of the query and Keywords document } d \\ & \text{are exactly alike.} \\ \frac{\sum_{i=1}^N SWK_{d,i}}{N} & ; \text{otherwise} \end{cases}$$

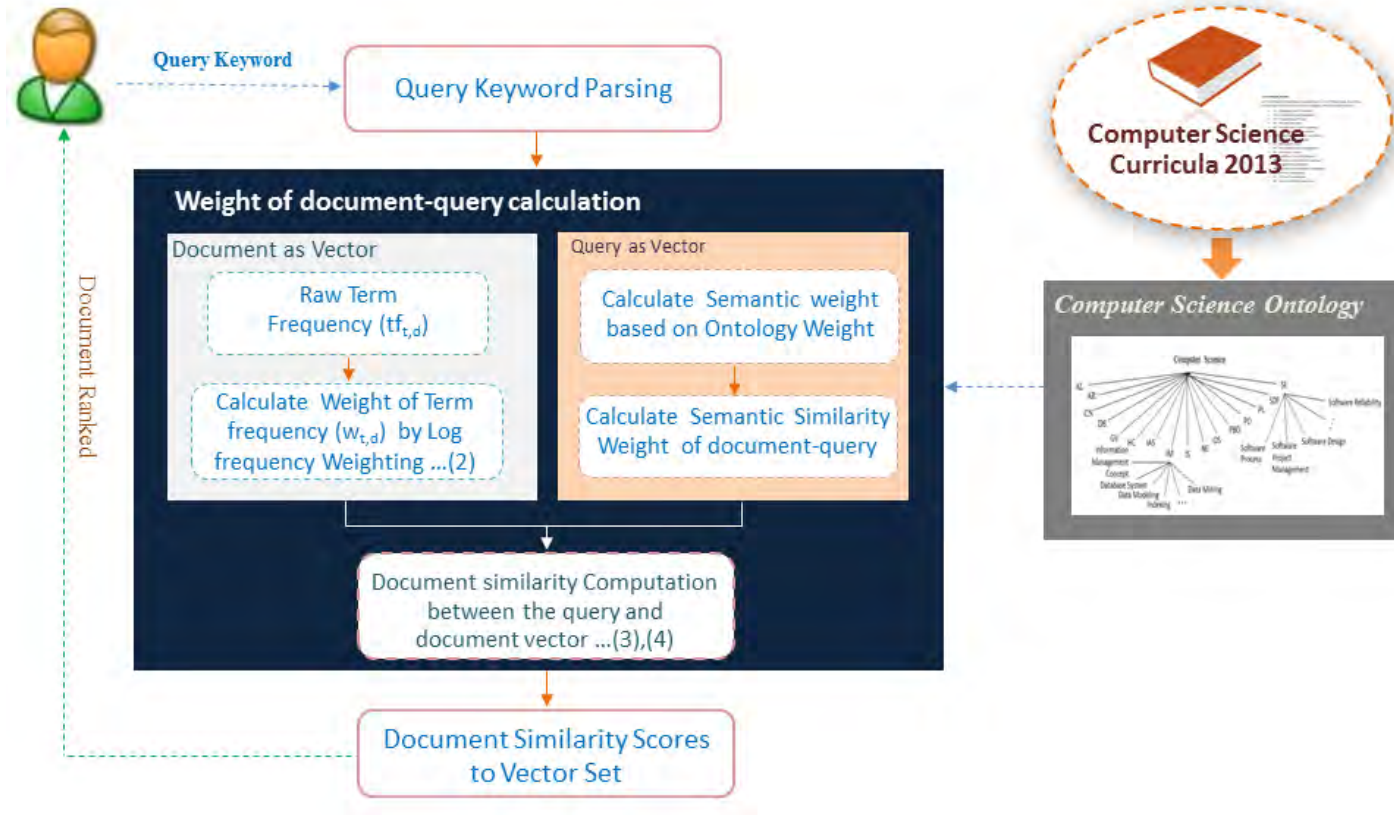


02 Semantic Similarity Search (Calculating Document Similarity Score)

Calculation Example



02 Semantic Similarity Search (Vector Space Model)



Vector Space Model Process

Semantic Ranking Process

Document as Vector

Term-Frequency

Title

DECISION MAKING DURING A TENDERING PROCEDURE: CASE STUDIES OF RESTRICTED EUROPEAN TENDERS IN ARCHITECTURE

Abstract

As they are spending public money, public organisations are bound by national and European rules and regulations. In the case of the built environment representatives of authorities make decisions about future buildings that can substantially impact the wellbeing of building users and the general public. These decisions deal with design quality within a frame of time and money and could cause conflict with the regulations. Most of the conflicts in design decision making have to do with the psychological and managerial aspects of decision making. Although theoretically tangible and intangible costs and benefits could have equal weight in decision-making, in practice tangible factors are more often regarded as a valid basis for decision making than intangibles. Based on findings from two cases studies, a framework is proposed that aims to improve the decisions made by public clients by incorporating perception of architectural quality without violating European tendering procedures. Both case studies concern the selection of an architect and are based on observation, interviews and document analysis; in one case for a town hall and in the second case for a large sized elementary school. The resulting framework can be seen as a first step towards guidelines for better decision making in these tendering processes.

Keyword

Keywords: architecture, decision making, design quality, public clients, tendering.

Term-Frequency

Terms	<i>tf-raw</i>	<i>tf-wght</i>
Architecture	2	1.3010
client	2	1.3010
Decision	6	1.7782
Design	3	1.4771
making	6	1.7782
Public	5	1.6990
quality	3	1.4771
Tender	5	1.6990
Case	3	1.4771

Three parts (Title,Abstract,Keyword) for Representation of Term within a document

02 Semantic Similarity Search (Vector Space Model)

Keyword : Decision Making

Document PID#115				Query	Product
Terms	<i>tf-raw</i>	<i>tf-wght</i>	n'lized	Semantic weight	
Architecture	2	1.3010	0.2433	0.25	0.0608
client	2	1.3010	0.2433	0.5	0.1217
Decision	6	1.7782	0.3325	1	0.3325
Design	3	1.4771	0.2762	0.5	0.1381
making	6	1.7782	0.3325	1	0.3325
Public	5	1.6990	0.3177	0.25	0.0794
quality	3	1.4771	0.2762	0.75	0.2072
Tender	5	1.6990	0.3177	0	0.0000
Case	3	1.4771	0.2762	0.5	0.1381
European	3	1.4771	0.2762	0	0.0000
procedure	2	1.3010	0.2433	0.25	0.0608
restricted	1	1.0000	0.1870	0	0.0000
studies	2	1.3010	0.2433	0	0.0000
Similarity Score (<i>Semantic Weight</i>) :					0.7864
Similarity Score (<i>Non-Semantic Weight</i>) :					0.5242

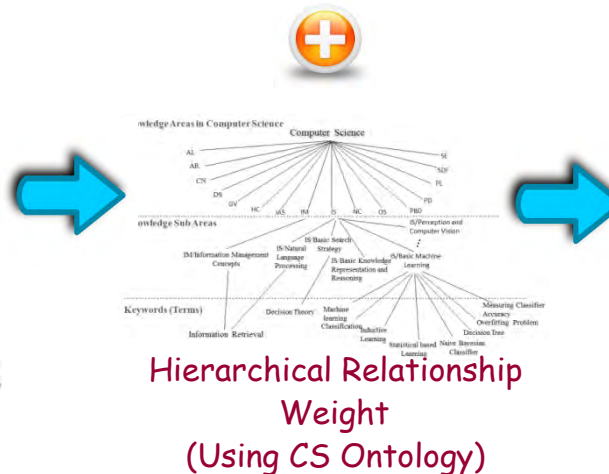
Retrieval Results

DECISION MAKING DURING A TENDERING PROCEDURE: CASE STUDIES OF RESTRICTED EUROPEAN TENDERS IN ARCHITECTURE

As they are spending public money, public organisations are bound by national and European rules and regulations. In the case of the built environment representatives of authorities make decisions about future buildings that can substantially impact the wellbeing of building users and the general public. These decisions deal with design quality within a frame of time and money and could cause conflict with the regulations. Most of the conflicts in design decision making have to do with the psychological and managerial aspects of decision making. Although theoretically tangible and intangible costs and benefits could have equal weight in decision-making, in practice tangible factors are more often regarded as a valid basis for decision making than intangibles. Based on findings from two cases studies, a framework is proposed that aims to improve the decisions made by public clients by incorporating perception of architectural quality without violating European tendering procedures. Both case studies concern the selection of an architect and are based on observation, interviews and document analysis; in one case for a town hall and in the second case for a large sized elementary school. The resulting framework can be seen as a first step towards guidelines for better decision making in these tendering processes.

Keywords: architecture, decision making, design quality, public clients, tendering.

TF-IDF Weights



Semantic Ranking



Cosine Similarity Measure

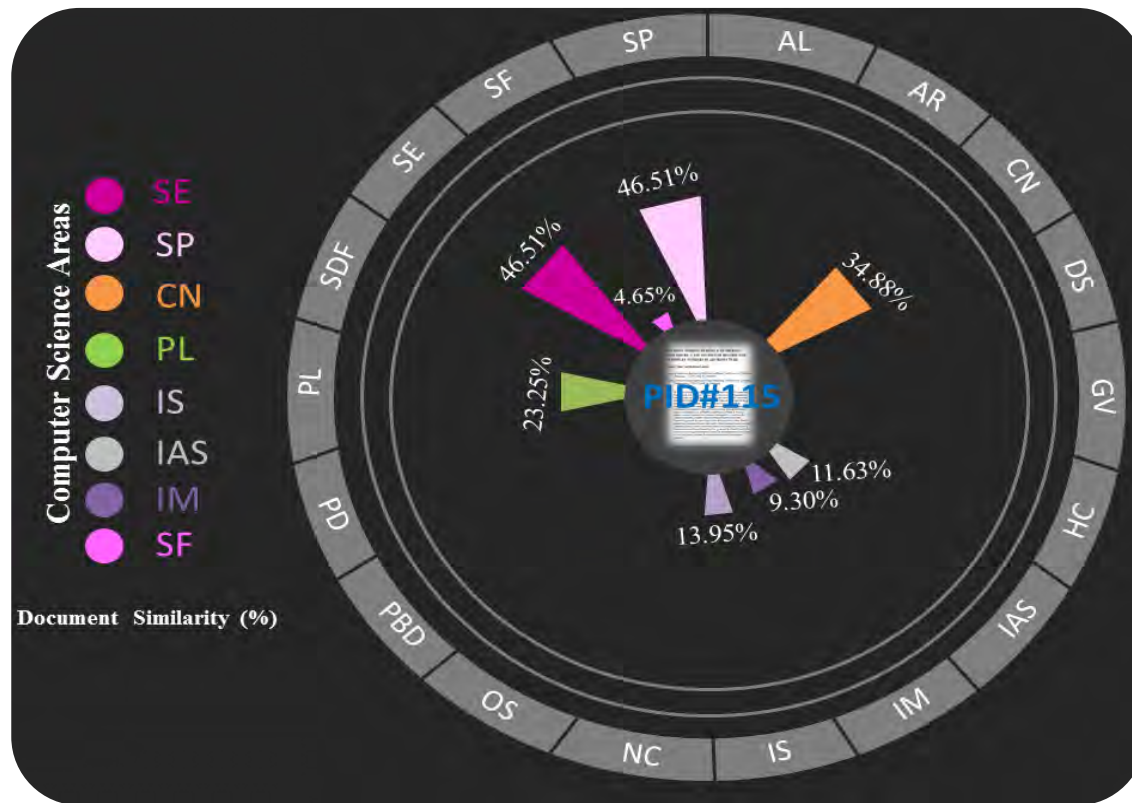
$$\text{sim}(d_j, d_k) = \frac{\vec{d}_j \cdot \vec{d}_k}{|\vec{d}_j| |\vec{d}_k|} = \frac{\sum_{i=1}^n w_{i,j} w_{i,k}}{\sqrt{\sum_{i=1}^n w_{i,j}^2} \sqrt{\sum_{i=1}^n w_{i,k}^2}}$$

02 Semantic Search (Query and Answering)

2

Query And Answering

Paper Similarity % in Computer Science Area

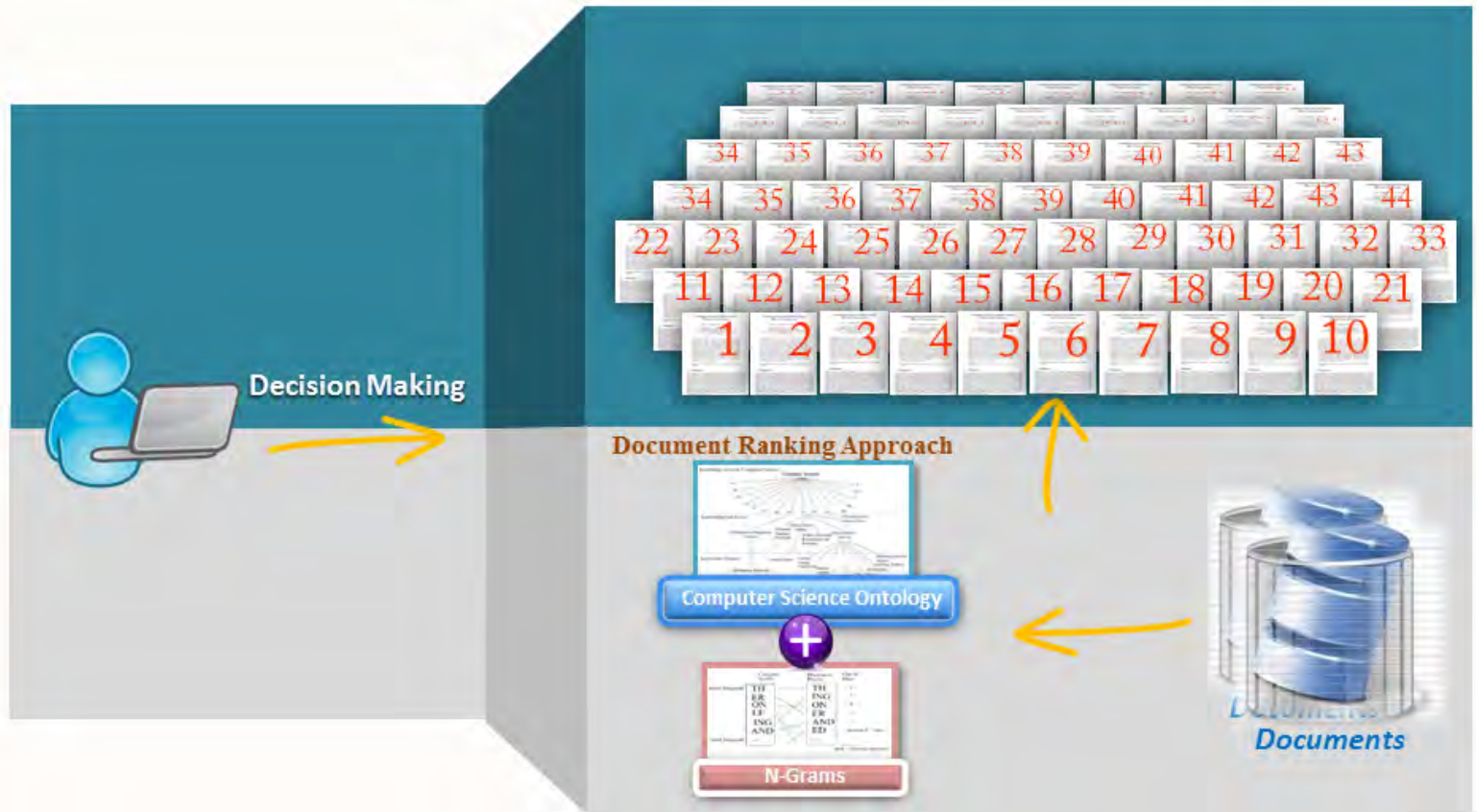


02 Semantic Similarity Search (Re-Ranking)

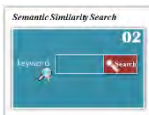
2

Semantic Similarity Process

Re-Ranking



Documents ranking

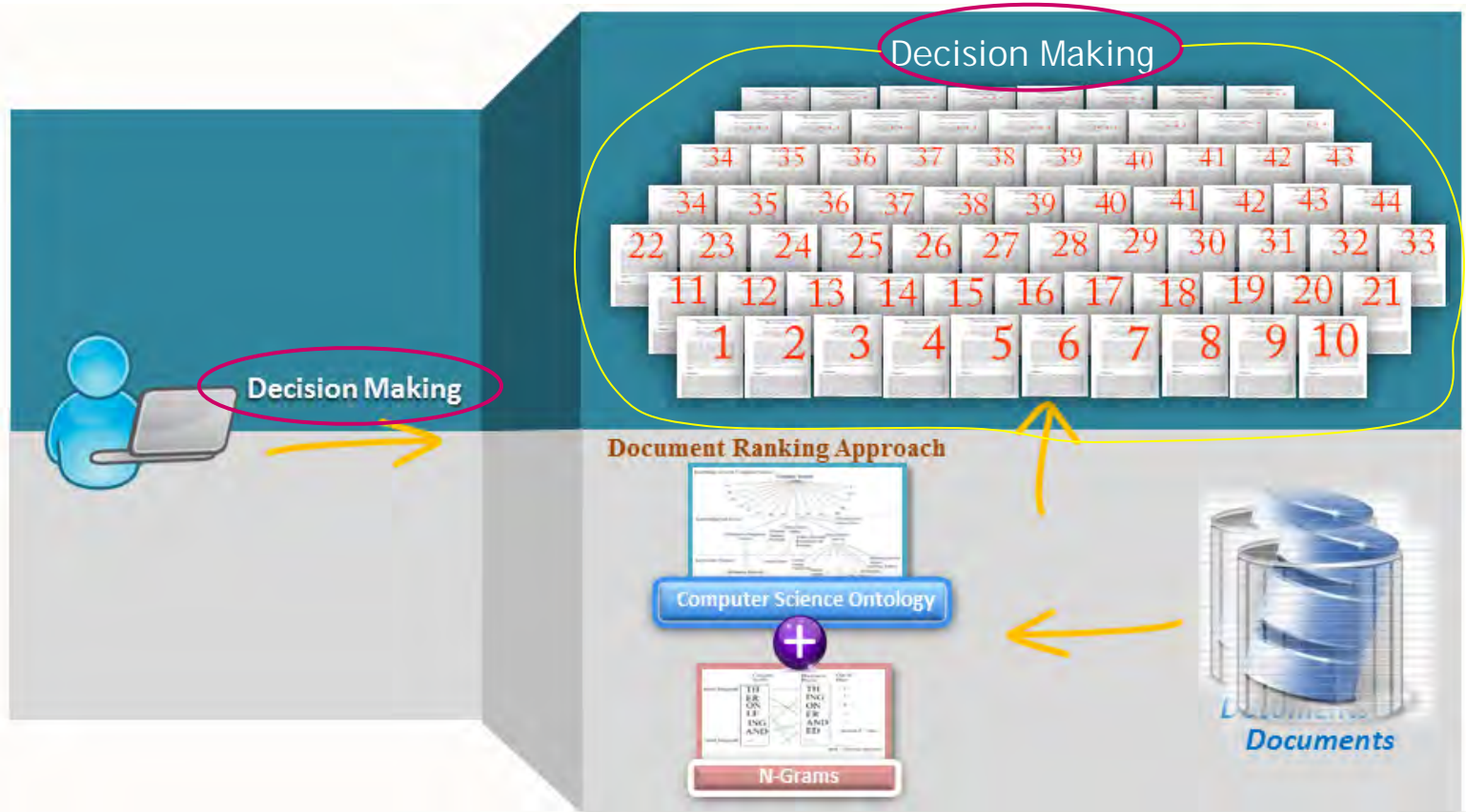


02 Semantic Similarity Search (Re-Ranking)

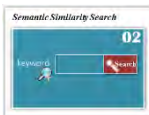
2

Semantic Similarity Process

Re-Ranking



Document ranking

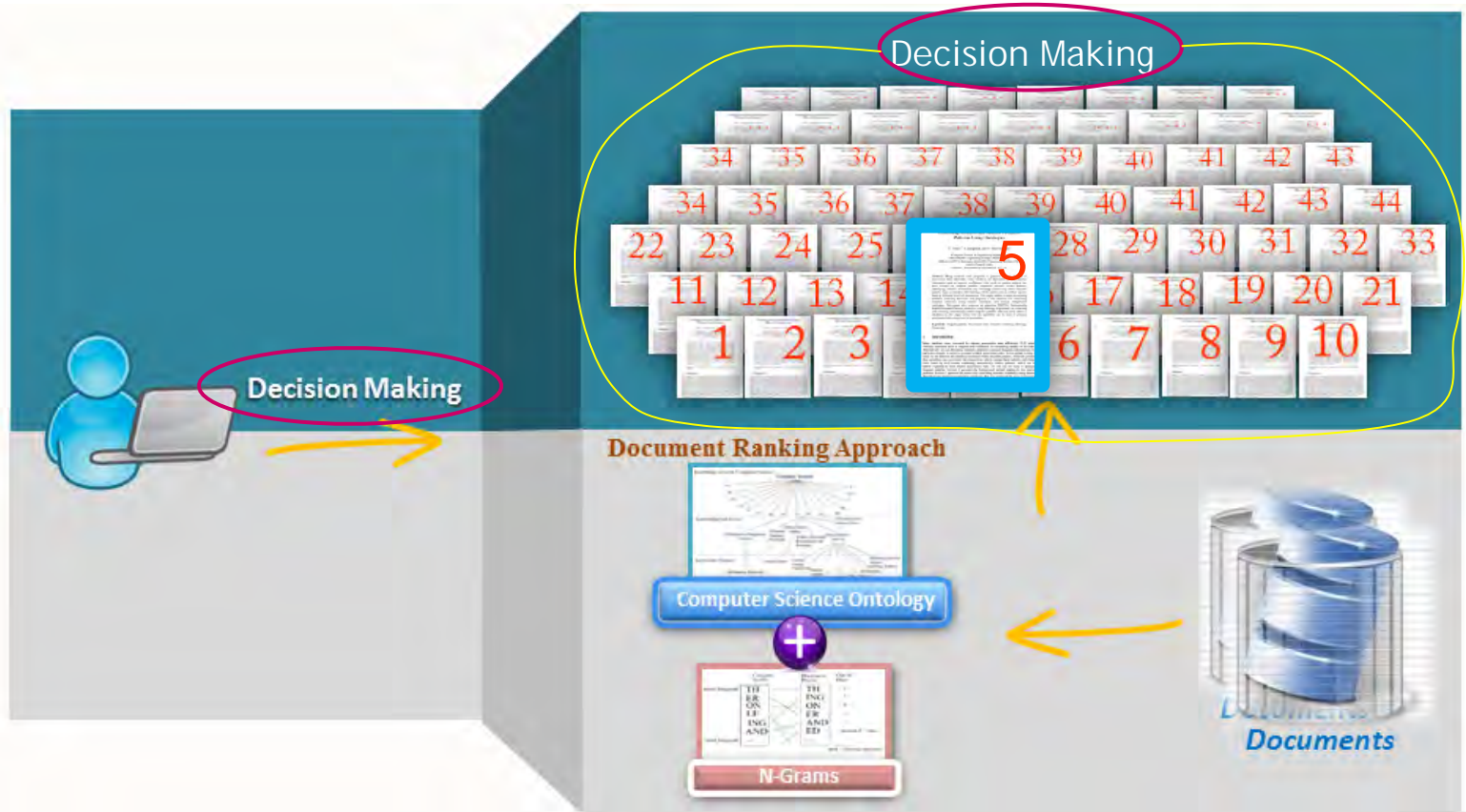


02 Semantic Similarity Search (Re-Ranking)

2

Semantic Similarity Process

Re-Ranking

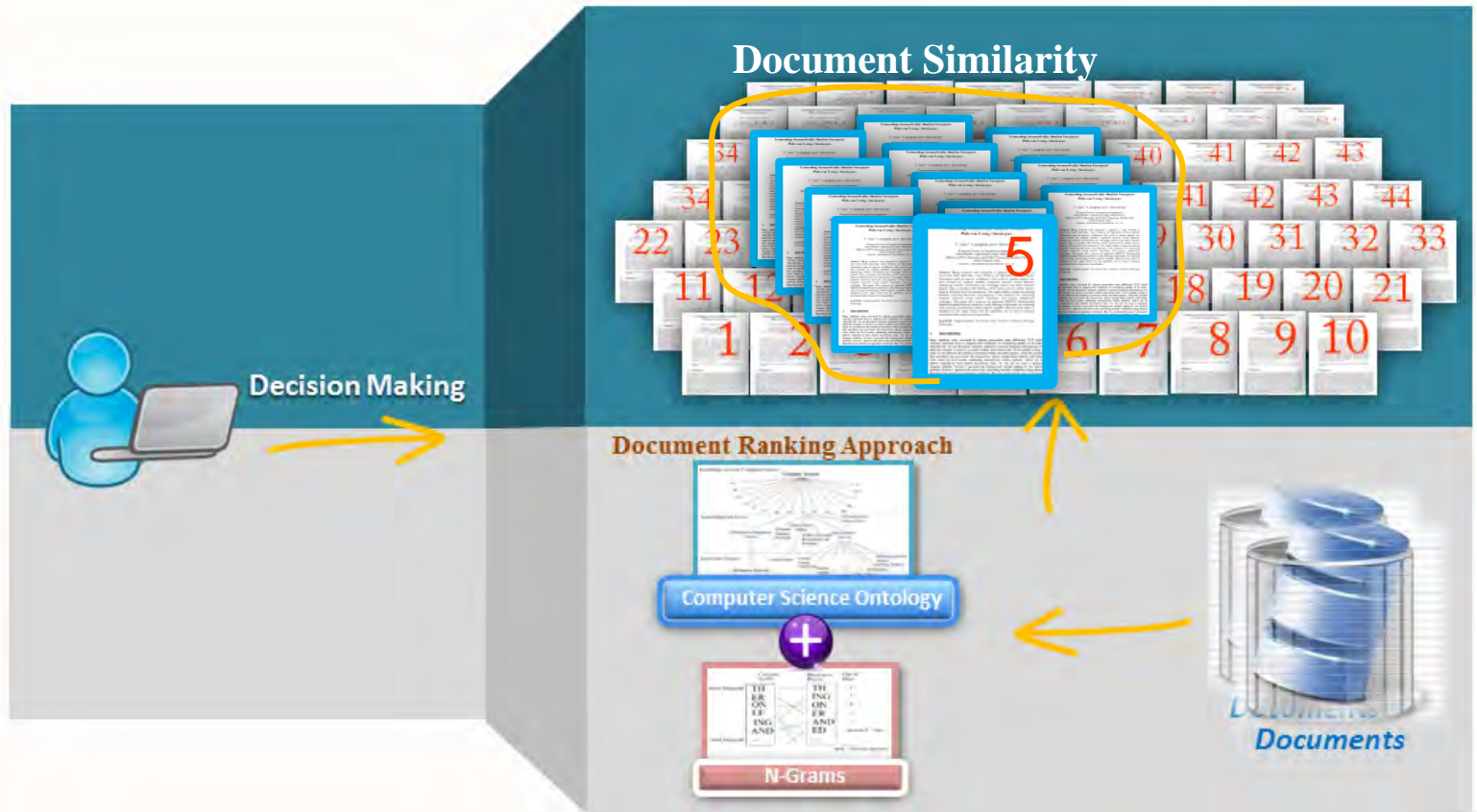


02 Semantic Similarity Search (Re-Ranking)

2

Semantic Similarity Process

Re-Ranking

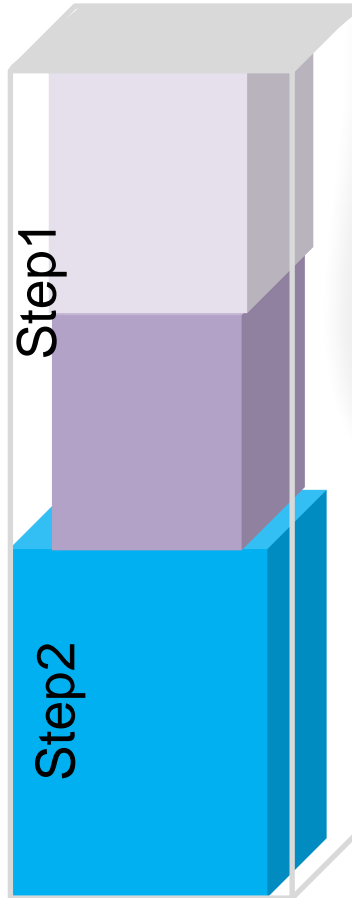


02 Semantic Similarity Search (Re-Ranking)

2

Semantic
Similarity
Process

Re-
Ranking



Step1 : Calculating the Keyword-Keyword similarity matrix Scores

- Calculating the Subsumption Weight (Hypernym/Hyponym Hierarchy).
- Calculating the string Similarity weight.

Step2 : Calculating The Document-Document similarity matrix Scores

Document Similarity Process



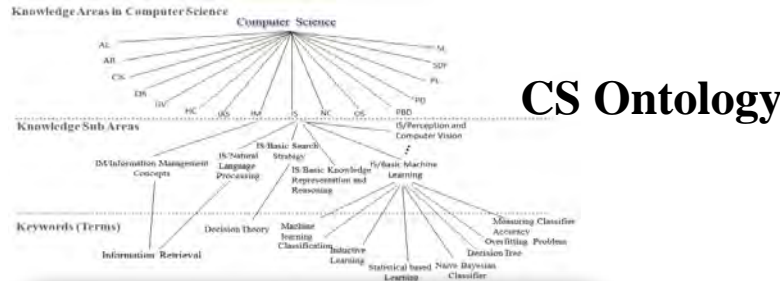
02 Semantic Similarity Search (Re-Ranking)

2

Semantic Similarity Process

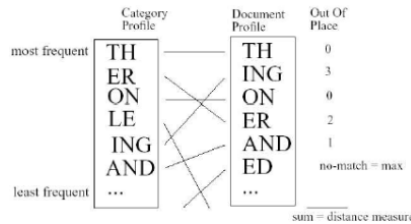
Re-Ranking

- Calculating the Keyword-Keyword similarity matrix Scores



Hierarchical Relationship Weight

Tri-Grams



Word Similarity Weight

$$SWK(KW_i, KW_j) = KWW_{n-grams} + KWW_{Cs-onto}$$

Summation of Semantic Keyword Weight.



02 Semantic Search (Re-Ranking)

2

Semantic
Similarity
Process

Re-
Ranking

- Calculating The Document-Document similarity matrix Scores

$$DSS(D_i, D_j) \cong \frac{\sum_{k=1}^n KWW_{ki} KWW_{kj}}{\alpha \sum_{k=1}^n KWW_{ki}^2 + (1 - \alpha) \sum_{k=1}^n KWW_{kj}^2} \left(\alpha = \frac{1}{2}\right)$$

$$= \frac{2 \sum_{k=1}^n KWW_{ki} KWW_{kj}}{\sum_{k=1}^n KWW_{ki}^2 + \sum_{k=1}^n KWW_{kj}^2}$$



Ref : Dice, L. R. (1945).



Document - Document Similarity

Document #115

DECISION MAKING DURING A TENDERING PROCEDURE: CASE STUDIES OF RESTRICTED EUROPEAN TENDERS IN ARCHITECTURE

Leentje Volker¹ and Kristina Lauche²

¹Faculty of Architecture, department of Real Estate and Housing, Delft University of Technology, Burgsteegweg 1, 2628 CR, Delft, the Netherlands.
²Faculty of Industrial Design, department of Design Methodology, Delft University of Technology, Landbergstraat 15, 2628 CE, Delft, the Netherlands

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Keywords: architecture, decision making, design quality, public clients, tendering.

INTRODUCTION

When spending public money, public organisations are bound to national and international tendering rules and regulations. In the case of the built environment public clients make decisions that could have a tremendous impact on the well-being of many people or groups of people. To organize a tendering procedure, a client needs to decide about the size and the content of the assignment, the kind of tendering procedure, the announcement of the assignment, the selection and awarding criteria and the awarding conditions. The procurement system currently being used for architectural and design services has its roots in three distinct systems of selection: tendering for the work, the selective search to identify a suitable designer and the architectural competition (Strong 1990). Design competitions have a long history (Fisher et al., 2007). However, applying the principles of the design competition in the context of EU tendering regulations could cause conflicts. These conflicts are partly related to the fact that the outward preference for rational decision making procedures

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Volker, L. and Lauche, K. (2006) Decision making during a tendering procedure: case studies of restricted European tenders in architecture. In: *Diary, A (Ed) Proc 24th Annual ARCOM Conference*, 1-3 September 2006, Cardiff, UK, Association of Researchers in Construction Management, 487-496.

Document
Keywords

Decision making
Architecture
Design quality
Public clients
Tendering



Hierarchical Relationship
Weight
(Using CS Ontology)



N-grams Weight
(Trigrams)

Document #847

Proceedings of the 12th International IEEE Conference on Intelligent Transportation Systems, St. Louis, MO, USA, October 3-7, 2009

WBAT3.2

An Indoor Intelligent Transportation Testbed for Urban Traffic Scenarios

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Abstract—This paper proposes a mobile architecture for the development of an indoor testbed for intelligent transportation systems. The main focus is the repeatable, low-cost tests for urban scenarios, especially for higher-level decision making and situation awareness problems. It provides a complete and modular testbed and is also used as a teaching platform. The proposed architecture has been in use at the Ohio State University Central and Intelligent Transportation Research Laboratory, as demonstrated in a number of traffic scenarios.

Keywords—indoor, decision making, situation awareness, sensor visualization, mobile robots, urban traffic.

The proposed architecture consists of several mobile agents, a scale network of roads, and multiple hardware and software modules that simulate various sensory modalities. Details on the architecture itself, each of its components and application examples can be found in the following sections.

I. INTRODUCTION

Sufficient testing is an essential part of research and development activities. For our main focus, intelligent transportation systems (ITS), the testing phase often includes preliminary testing in simulation environments and physical tests involving one or more vehicles.

One major limitation of tests involving vehicles, as we observed throughout our experience in this particular field [1], is that outdoor testing can have a high cost in terms of logistics and scheduling. Since adequately equipped testing areas are not always readily accessible, scheduling for transportation of the multiple parties involved and for favorable weather conditions can be a problem in and of itself.

This paper suggests a low-cost, flexible supplement to outdoor testing for intelligent transportation research and applications. An indoor testbed that combines the focused aspects of an outdoor environment is often effective for tests involving multiple vehicles, higher-level decision making, and situation awareness. The generally lower speed of urban traffic scenarios, as opposed to automated highway systems, makes indoor testing a particularly attractive option for consistent, repeatable tests.

Another advantage of an indoor testbed is that it can be used as a teaching tool more efficiently than outdoor testbeds. Various laboratory courses and projects can be offered on the same testbed and the high number of mobile agents coupled with the controlled environment makes it possible for a number of students to work in parallel.

Our implementation of the proposed architecture is currently in use at The Ohio State University Central and

Intelligent Transportation Research Laboratory, as seen in Figure 1, both as a research testbed and a teaching environment.



Figure 1. The indoor testbed at The Ohio State University Central and Intelligent Transportation Research Laboratory.

II. SYSTEM ARCHITECTURE

The overall system consists of a number of discrete modules, both in the software and hardware domains. This section briefly describes the working principle and the interconnection of the modules, while the next section gives more detailed descriptions of each.

A number of mobile agents can be deployed on the testbed in parallel. Each mobile agent, as illustrated in Figure 2, has a unique identification number and a matching unique visual tag. This visual tag can be identified and tracked via a stationary camera system, located above the testbed.

The Virtual GPS module, connected to the camera system uses image processing techniques to generate the real-time

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Document
Keywords

Decision making
Mobile robots
Sensor virtualization
Situation awareness
Testbed
Urban traffic

Document #115

DECISION MAKING DURING A TENDERING PROCEDURE: CASE STUDIES OF RESTRICTED EUROPEAN TENDERS IN ARCHITECTURE

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As they are spending public money, public organizations are bound by national and European rules and regulations. In the case of the built environment representatives of authorities make decisions about future buildings that can substantially impact the well-being of inhabitants and the general public. These decisions deal with design quality within a frame of time and money and could create conflicts with the population. One of the conditions for being a decision maker is to be able to weigh the pros and cons of the options. In this paper, we explore how decision makers in architecture tend to weigh the pros and cons of the options. We explore how decision makers in architecture tend to weigh the pros and cons of the options. We explore how decision makers in architecture tend to weigh the pros and cons of the options.

Keywords: architecture, decision making, design quality, public clients, tendering.

INTRODUCTION

When spending public money, public organizations are bound to national and international tendering rules and regulations. In the case of the built environment public clients make decisions that could have a tremendous impact on the well-being of many people or groups of people. To organize a tendering procedure, a client needs to decide about the size and the content of the assignment, the kind of tendering procedure, the assignment, the selection, the selection criteria, the awarding conditions. The procurement system currently being used for architecture and design services has its roots in three distinct systems of selection: tendering for the work, the selective search to identify a suitable designer and the architectural competition (Stevens 1990). Design competitions have a long history (Fishar et al. 2007). However, applying the principles of the design competition in the context of EU tendering regulations could cause conflicts. These conflicts are partly related to the fact that the current preference for rational decision making procedures

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Document #847

An Indoor Intelligent Transportation Testbed for Urban Traffic Scenarios

Scott Hildrestone, Arda Kurt, Michael Verner, Keith Boland and Clint Osgood
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 Columbus, OH, U.S.A.

Abstract—This paper presents a modular architecture for the development of an indoor testbed for intelligent transportation systems (ITS). The testbed architecture includes a central control system (CCS) and a set of intelligent transportation systems (ITS) testbeds. The testbed architecture is designed to support a wide range of ITS applications, including vehicle-to-vehicle (V2V) communication, vehicle-to-infrastructure (V2I) communication, and vehicle-to-pedestrian (V2P) communication. The testbed architecture is designed to support a wide range of ITS applications, including vehicle-to-vehicle (V2V) communication, vehicle-to-infrastructure (V2I) communication, and vehicle-to-pedestrian (V2P) communication.

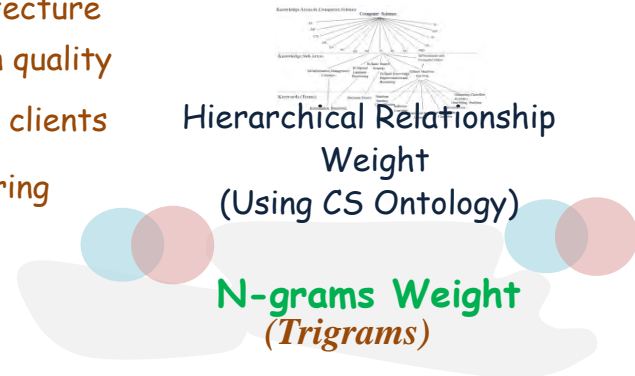


The overall system consists of a number of distributed control systems, each with its own set of sensors and actuators. The testbed architecture is designed to support a wide range of ITS applications, including vehicle-to-vehicle (V2V) communication, vehicle-to-infrastructure (V2I) communication, and vehicle-to-pedestrian (V2P) communication. The testbed architecture is designed to support a wide range of ITS applications, including vehicle-to-vehicle (V2V) communication, vehicle-to-infrastructure (V2I) communication, and vehicle-to-pedestrian (V2P) communication.

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Decision making

Architecture
 Design quality
 Public clients
 Tendering



Mobile robots
 Sensor virtualization
 Situational awareness
 Testbed
 Testbed

Keyword-Keyword Similarity Matrix Scores

Document Keyword	Decision making	Architecture	Design quality	Public clients	Tendering	Mobile robots	Sensor virtualization	Situational awareness	Testbed	Urban traffic
Decision making	2	0.50	0.67	0.50	0.21	0.31	0.39	0.40	0.00	0.31
Architecture	0.50	2	0.75	0.75	0.00	0.57	0.50	0.56	0.00	0.25
Design quality	0.67	0.75	2	0.75	0.00	0.25	0.40	0.30	0.00	0.31
Public clients	0.50	0.75	0.75	2	0.00	0.62	0.25	0.30	0.00	0.37
Mobile robots	0.31	0.57	0.25	0.62	0.00	2	0.25	0.30	0.00	0.50
Sensor virtualization	0.39	0.50	0.40	0.25	0.00	0.25	2	0.80	0.00	0.30
Situational awareness	0.40	0.56	0.30	0.30	0.00	0.30	0.80	2	0.00	0.30
Urban traffic	0.31	0.25	0.31	0.37	0.07	0.50	0.30	0.30	0.08	2

Document-Document Similarity Matrix Scores

Document	#115	#847
#115	1	0.4346
#847	0.4346	1

Experiment Results

Table 1 : Document-Document Similarity Matrix Scores
(Keyword Matching Weight)

Paper ID	115	847	1055	553	584	Query
115	1	0.1818	0.2222	0	0	0.3333
847	0.1818	1	0.2	0	0	0.2857
1055	0.2222	0.2	1	0	0	0.4000
553	0	0	0	1	0	0
584	0	0	0	0	1	0
Query	0.3333	0.2857	0.4000	0	0	1

Table 2 : Document-Document Similarity Matrix Scores
(Using Our Semantic Weight)

Paper ID	115	847	1055	553	584	Query
115	1	0.4346	0.6853	0.3990	0.4334	0.8231
847	0.4346	1	0.4551	0.3574	0.3425	0.6424
1055	0.6853	0.4551	1	0.3944	0.3578	0.8290
553	0.3990	0.3574	0.3944	1	0.4999	0.7167
584	0.4334	0.3425	0.3578	0.4999	1	0.6959
Query	0.8231	0.6424	0.8290	0.7167	0.6959	1

Experiment Results

Document #115

DECISION MAKING DURING A TENDERING PROCEDURE: CASE STUDIES OF RESTRICTED EUROPEAN TENDERS IN ARCHITECTURE

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²Faculty of Industrial Design, Department of Design Methodology, Delft University of Technology, Landbergweg 15, 2628 CE Delft, the Netherlands.

As they are spending public money, public organisations are bound by national and European rules and regulations. In the case of the built environment, representatives of numerous stakeholder groups have to be consulted. The decision-making process is often complex and involves many people. Most of the conflicts in design decisions making have to do with the psychological and non-rational aspects of decision making. Although theory and practice suggest that decision-making should be based on rational criteria, the decision-making process is often influenced by non-rational criteria. This research is proposed that aims to improve the decisions made by public clients by using a tendering procedure. Based on the findings from two case studies, the decision-making process is investigated. The research is based on a tendering procedure. Both case studies concern the selection of an architect and are based on observations, interviews and document analysis. In one case for a town hall and in the second case for a large residential school. The resulting framework can be used as a first step towards guidelines for better decision making in design tendering processes.

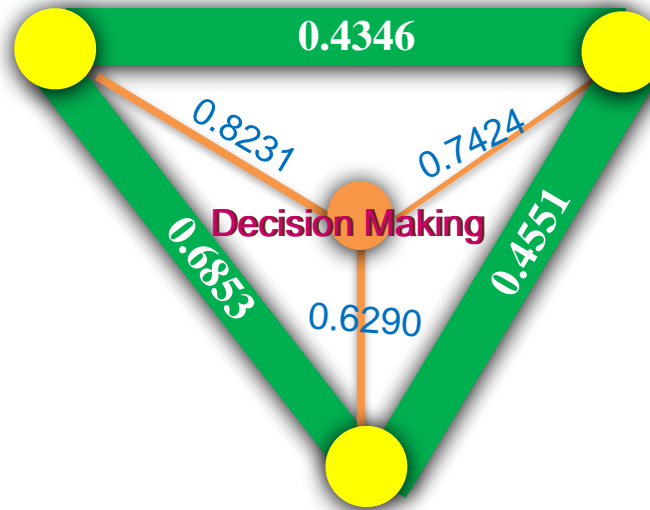
Keywords: architecture, decision making, design quality, public clients, tendering.

INTRODUCTION

When spending public money, public organisations are bound to national and international tendering rules and regulations. In the case of the built environment public clients make decisions that could have a tremendous impact on the wellbeing of many people or groups of people. To organize a tendering procedure, a client needs to decide about the site and the content of the assignment, the kind of tendering procedure, the announcement of the assignment, the selection and awarding criteria and the awarding conditions. The procurement system currently being used for architectural and design services has its roots in three distinct systems of selection: tendering for the work, the selective search to identify a suitable designer and the architectural competition (Grogan 1989). Design competitions have a long history (Fisher et al. 2007). However, applying the principles of the design competition in the context of EU tendering regulations could cause conflicts. These conflicts are partly related to the fact that the current preference for rational decision making procedures

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Document #1055

A Cordan and Search Model and Simulation Using Tabled, Stochastic, Colored Petri Nets for Robust Decision-Making

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Keywords: robustness, decision-making, cordan and search, Petri Net.

Abstract
In the current military operating environment, cordan and search missions (village search) are conducted daily. It is expected that this mission profile will not change in the near future. Despite the frequency of this mission type, the planning tools available to military leaders are rudimentary and tedious. Planners must rely on over-simplified data tables and personal experience when planning a cordan and search. Computer tools to facilitate these tasks, such as accurate stochastic Petri Net models for cordan and search missions that can provide planners with a realistic insight into Mean Cycle Completion Method. This model can be used by military leaders to make robust decisions during mission planning and to improve the quality of the final plan.

1. INTRODUCTION

In the fast-paced, dynamic world of military operations, cordan and search missions (i.e., village search) are conducted daily to capture insurgents, search villages, and coordinate combat. These missions are complex, and the planning for these involves allocating search resources to target buildings in a manner that efficiently achieves the mission objectives. It is a difficult task to make accurate, feasible plans. This requires knowledge of the search resources involved (e.g., size of the team, team composition, team search rate), the target buildings (e.g., size, location, disposition of inhabitants), the weather (e.g., precipitation, temperature, humidity), and other parameters. Properly a task related with a village search mission is given a time

constraint for the completion of the mission. This constraint affects the development of the plan and the manner in which it is conducted. To add to the complexity of the planning, participating elements can include civilian, military (Special Operations Forces (SOF)), Explosive Ordnance Disposition (EOD), military search (Armored Cavalry (AC)), and electronic surveillance. Given these different planning factors, it is a complex problem to create plans for a cordan and search mission that are robust against environmental uncertainties. This problem is being addressed by the ITEC, People-Autonomy-Robots (PAR) Laboratory (1). People the frequency and difficulty of developing cordan and search plans, military planners currently rely on simplistic data tables from military field manuals (e.g., [2], [3], [4]) and personal experience to conduct analysis of the mission during the planning phase. The search is often very demanding in accuracy and quality and therefore has high service members in higher than desired by leaders. The variability in quality is due to dependencies on the quality of the input and the calculation methods used by the planner. The variability in quality is due to users' cognitive abilities and prior experiences that can have a positive or negative effect on the quality of the plan.

An accurate tool using Petri Nets [5] can improve the mission planning process and can help produce more robust plans. The proposed stochastic tool would allow: (a) the target buildings in a manner that efficiently achieves the mission objectives, (b) the search is often very demanding in accuracy and quality and therefore has high service members in higher than desired by leaders. The variability in quality is due to dependencies on the quality of the input and the calculation methods used by the planner. The variability in quality is due to users' cognitive abilities and prior experiences that can have a positive or negative effect on the quality of the plan.

¹The research was supported by the Department of Defense, Army Research Office (ARO) grant number W51420-04-2-0001, and by the Colorado State University Office of Research.

Document #847

Proceedings of the 12th International IEEE Conference on Intelligent Transportation Systems, St. Louis, MO, USA, October 6-9, 2008 An Indoor Intelligent Transportation Testbed for Urban Traffic Scenarios

WUAT3.2

Scott Bialkowski, Arja Kart, Michael Vomer, Keith Radwin and Dan Oguzturk
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Columbus, OH, U.S.A.

Abstract: This paper proposes a modular architecture for the development of an indoor testbed for intelligent transportation systems. The main focus is on replicating, to some extent, the urban environment, especially for high-level decision making and situation awareness problems. It provides a replacement to outdoor testbeds and is also used as a training platform. The proposed architecture has been in use at the Ohio State University, Central and Eastern European Research Laboratory, as demonstrated in a number of traffic scenarios.

Keywords: indoor, decision making, situation awareness, user requirements, traffic rules, urban traffic.

1. INTRODUCTION

Sufficient testing is an essential part of research and development activities. For our main focus, intelligent transportation systems (ITS), the testing plans often include performance testing in maximum simulation environments and physical tests involving one or more vehicles.

One major limitation of using real vehicles, as we observed throughout our experience in the particular field [1], is that outdoor testing can have a high cost in terms of logistics and scheduling. Since adequately equipped testing areas are not always readily available, scheduling for transportation of the multiple parties involved and for favorable weather conditions can be a problem in and of itself.

This paper proposes a low-cost, flexible replacement to outdoor testing for intelligent transportation research and applications. An indoor testbed that simulates the focused aspects of an outdoor environment is often effective for tasks involving multiple vehicles, high-level decision making, and situation awareness. It generally allows a higher level of control, as opposed to automated highway systems, which involve testing a particularly sensitive system for consistency, repeatability.

Another advantage of an indoor testbed is that it can be used as a training tool more efficiently than outdoor testbeds. Because laboratory covers and protects can be offered on the same testbed and the high number of mobile agents complex the outdoor environment makes it possible for a number of scenarios to work in parallel.

One implementation of the proposed architecture is currently in use at The Ohio State University Central and

Intelligent Transportation Research Laboratory, as seen in Figure 1, both as a research testbed and a training environment.

The proposed architecture consists of several mobile agents, a local network of roads, and multiple hardware and software modules that coordinate system sensory modalities. Details on the architecture itself, each of its components and application examples can be found in the following sections.



Figure 1. Indoor testbed at The Ohio State University Central and Eastern European Research Laboratory.

II. SYSTEM ARCHITECTURE

The overall system consists of a number of discrete modules, both in the software and hardware domains. This section briefly describes the testing process and the interconnection of the modules, while the next section goes into detailed description of each.

A number of mobile agents can be deployed on the testbed in parallel. Each mobile agent, as illustrated in Figure 2, has a unique identification number and a matching unique visual tag. This visual tag can be identified and tracked by a stationary camera system located above the testbed.

The Visual GPS module, connected to the camera system, uses image processing techniques to generate the location.

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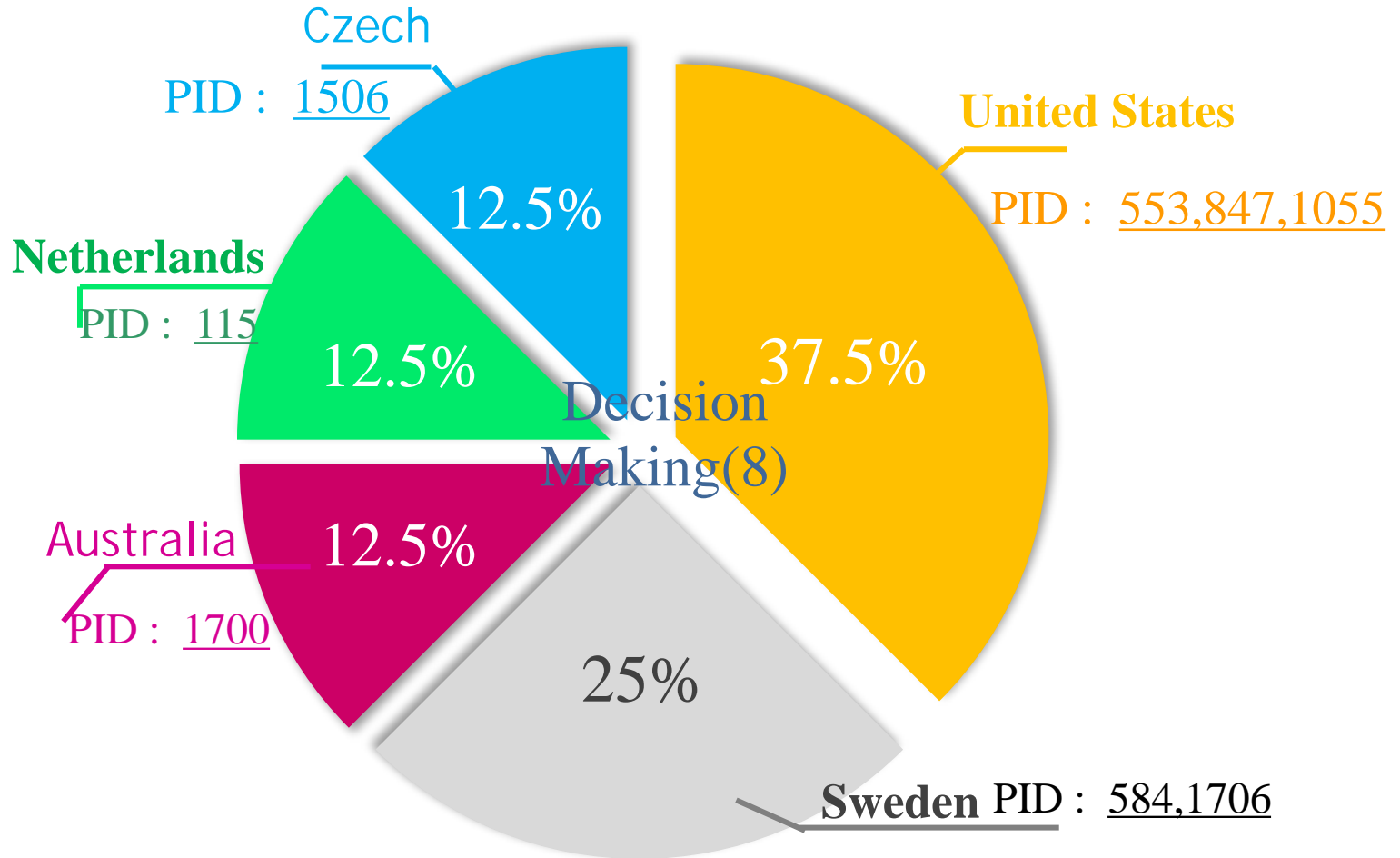
721

02 Semantic Similarity Search (Semantic Similarity)

2

Selecting
Semantic
Context

(Country)

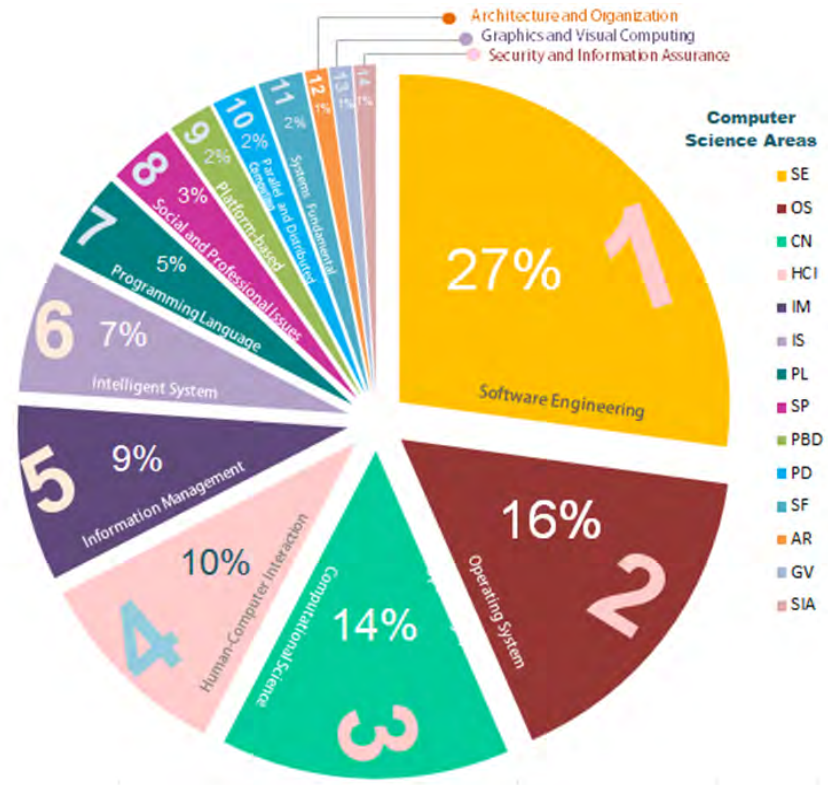


02 Semantic Search (Query and Answering)

3

Query
And
Answering

Computer Science Research Area in UK



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TITLE-ABS-KEY (semantic search: document ranking AND clustering using computer science ontology AND n-grams) Edit Save Set alert Set feed

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Boonyoung, T. (1)

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Semantic Search: Document Ranking and Clustering Using Computer Science Ontology and N-Grams

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King Mongkut's University of Technology North Bangkok
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 Journal of Digital Information Management

ABSTRACT: Semantic similarity has become an important tool and widely been used to solve traditional information retrieval problems. This study adopts ontology of computer science and proposes an ontology ranking weight based on Wu and Palmer's edge counting measure and uses the N-grams method for computing a family of word similarity. This study also compares the subsumption weight between Mikolajik and Alcora's weight and query keywords (Decision Making, Genetic Algorithm, Machine Learning, Neuronic). A probability value (p-value) from the t-test ($p < 0.10$) is higher 0.05, which indicates the evidence of no significant differences between the two weights methods. The experimental results show the new keyword-keyword similarity matrix scores that compute from hierarchical relationship weight based on Computer Science ontology and string matching (n-grams) for computing of string of keywords. We computed the document-document similarity matrix scores using our keyword similarity matrix scores and compared them with the keyword matching weights using Dice coefficient method. In addition, this paper, we presented a new document semantic ranking procedure for the semantic ranking that proposes a new weight of query term in the document based on Computer Science Ontology weight. The experimental results show that the new document similarity score between a user's query and the paper suggests that the new measures were effectively ranked.

Keywords: Document Ranking, Document Similarity, Vector Space Model, Computer Science Ontology, Ontology Ranking, N-Grams

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1. Introduction

In the last few years, the amount digital documents has been increasing that is electronically available has increased rapidly and, as a result, the development of information storage and retrieval systems has become a significant challenge. A good information retrieval system should retrieve only those relevant documents from large databases and appropriate for user's query, not a lot of unnecessary data.

A document ranking is an ordering of the documents retrieved that reflects the relevance of the documents to the user query. Document ranking algorithm is one of importance process in retrieval mode to efficiently present the search results and the top ranked documents would have highest similarity score. One of the simplest ranking functions is computed by the 'tf-idf' algorithm [1], based on the value of the keyword that is stored by the frequency of the keyword that it appears in the database system and number of times the word will be appears in the document can be the value of the term vector in the document. The traditional ranking technique such as Dice coefficient, Jaccard coefficient and Cosine coefficient are common similarity measures based on vector space model [1].

The traditional document ranking (keyword-based search)

Categories and Subject Descriptors: H.3.1 [Content Analysis and Indexing]: indexing methods; H.3.3 [Information Search and Retrieval]

General Terms: Semantic, Information Search, Ontology

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Thank you