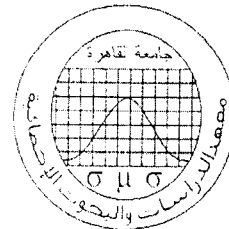


Cairo University
Institute of Statistical Studies and Research
Department of Computer and Information Sciences
Exam of IS 604- June 2012
Time Allowed: 3 hours
Examination by: Dr. Tarek Elghazaly



(Q1) [25 marks]

- List & Describe briefly the 6 kinds of knowledge of a language that are needed for studying complex language behavior [12 marks].
- Describe briefly four possible approaches for dealing with Ambiguity [8 marks].
- Define Morphology, Morphemes, Stems and Affixes. Illustrate the relations between them. [5 marks]

(Q2) [30 marks]

- What is "Word *Sense Disambiguation*"? [3 marks]
- List the 7 traditional parts of speech.[7 marks]
- Write a regular expression to match the following [20 marks]:
 - ae, ace, acce, accce,...etc.
 - ace, acce, accce,...etc.
 - acce, accce, acccce.
 - Any decimal number.
 - Computer Science, Computer science, computer Science, computer science.
 - A0C, A1C, A2C, A3C, ...etc.
 - ac, abc, abbc, abbbc,...etc. at the start of the line.
 - ab, abc, abcc, abccc, ...etc
 - abc, abcabc, abcabcabc,...etc.
 - a
b

(Q3) [15 marks]

Given the below tables, provide the bi-gram language model .

Count (C R)						
	يايها	الإنسان	هل	تبكي	لما	أبكاني
يايها	5	827	0	9	0	0
الإنسان	2	0	608	1	6	6
هل	2	0	4	686	2	0
تبكي	0	0	2	0	16	2
لما	1	0	0	0	0	82
أبكاني	15	0	15	0	1	4

	تبكي	لما	أبكاني	يايها	الإنسان	هل
Count	746	158	1093	2533	927	2417

_____ Good Luck _____

I. Knowledge Engineering

As part of improving school system, it was decided to an advanced intelligent information system for school administration (ادارة المدارس), let us call it "scholadmin." Such a system would handle class schedules, assignment of teachers to classes, absence of teachers and substitute teachers, etc.

As part of developing this system we acquire knowledge and build a knowledge base, including an ontology (or more), as part of adding intelligence to the information system. The knowledge should cover status of teachers and school administrators, ranks of teachers, areas of specialty of each teacher in addition to problems to be solved in schools and decisions to be made

To build a knowledge base about the schools and school system, you need to acquire (elicit) knowledge.

- a. Name five knowledge acquisition techniques.
 - b. Name five knowledge representations.
 - c. Name five sources of knowledge in this application specifying for each what kind of knowledge they have.
 - d. Build a knowledge acquisition plan to gain knowledge for such a system. (show at least 7 acquisition tasks)
 - e. Draw a diagram showing the process of building the knowledgebase.
-

II. Semantic Web Concepts

Those are words that we used in speaking about Semantic Web.

Pruning, Frames, Ontology learning, Interviews, Generalization, Evolution, Rules, Acquisition, Ontology maintenance, Semantic Networks, URI, Ontology integration, webODE, Merging, Unicode, Alignment, SPARQL, OIL, Questionnaires, Configuration management, Brain storming, Conceptualization, RDFS, Prompt, Specification, URL, Specialization, OAV, Development process, Task Observation, Clarity, Coverage extension, scrapers, Extendibility, OWL, Coherence, Concepts, HTML, serializers, Vocabulary, Protégé, RDF, Document Inspection, XML, Namespace, DAML, ontoEdit, OIL

- 1) Group them into meaningful sets and give each set a name reflects the meaning.
- 2) Represent the grouped sets into a meaningful structure that reflects their relationships.
- 3) Give a short description of each of the following: XML, HTML, RDF, OWL, OIL, URI, URL, W3C, Protégé, Prompt.

- III. When we discussed knowledge representations, we did not consider RDF. Do you think RDF is a knowledge representation? Give reasons.
-

IV. Discussion Issue

News analysts need to gather news articles according to geographical locations. This is challenging since the locations have relationships that may not be realized by the search engine. For example, a piece of news referring to "Cairo" should be realized as it occurred in Egypt since Cairo is the Capital of Egypt; the same applies to Tanta since it is a city in Egypt.

Assume you are working for a news paper and you are asked to develop an *intelligent search engine for news in Egypt*. You decided to rely on knowledge system that be used in such a system.

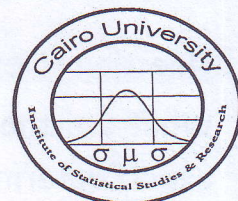
- 1) Using the above example, describe Geographical Semantic news search.
 - 2) Identify two challenges that you may face.
 - 3) If you would build ontology for geography of Egypt, what would be the basic concept (the atomic component)? What would be the attributes of this concept?
 - 4) If you find geographical ontology already exist, describe how you would adapt it to be used in your application.
 - 5) If you find more than one ontology, would you merge them, or align concepts?
 - 6) Sketch a diagram showing the system and ontology(s) with software and show relationship between software and the Ontology.
 - 7) Suggest an Ontology language and an Ontology development tool that can be used for your solution.
 - 8) Do you think we can automatically extract knowledge from the data? If yes, what and how?
-

V. Research Paper

Write three paragraphs about a paper you have read during the course.



Cairo University

**Cairo University – Institute Of Statistical Studies
And Researches****Department:** Computer Sciences**Academic Year:** 2015/2016 **Semester:** Spring**Date:** 29-5-2016 **Level:** Diploma/ Master/ Ph.D.**Course Title:**

Intelligence Systems

Course code:

CS602

Time:

3 Hours

Exam marks:

70

Exam. Sheets:

2

Exam. Instructions : Dr. Khaled T. Wassif**Attempt ALL Questions:****Question One: (8 Marks)**

What are the major players in the expert system development team? Describe the role of each of them.

Question Two: (8 Marks)

What is a conflict set of rules? How can we resolve a conflict? Describe the basic conflict resolution methods.

Question Three: (8 Marks)

Describe the backward chaining inference process using an example. Why is backward chaining used for diagnostic problems?

Question Four: (14 Marks)

Suppose an expert; given four conditionally independent evidences E_1 , E_2 , E_3 and E_4 , creates three mutually exclusive and exhaustive hypotheses H_1 , H_2 and H_3 . The following table illustrates the prior and conditional probabilities provided by the expert:

Probability	Hypothesis		
	$i = 1$	$i = 2$	$i = 3$
$p(H_i)$	0.40	0.35	0.25
$p(E_1 H_i)$	0.3	0.7	0.4
$p(E_2 H_i)$	0.8	0.0	0.5
$p(E_3 H_i)$	0.5	0.5	0.6
$p(E_4 H_i)$	0.2	0.3	0.7

If the evidences are observed in the order E_4 , E_2 , E_3 and then E_1 ; compute the posterior probabilities for all hypotheses.

Question Five: (8 Marks)

What are the likelihood of sufficiency and likelihood of necessity? How does an expert determine values for both likelihoods?

Question Six: (8 Marks)

Define a certainty factor. How does an expert system establish the net certainty for conjunctive and disjunctive rules? Give an example for each case.

Question Seven: (8 Marks)

How are objects related in frame-based systems? What are the 'a-kind-of' and 'a-part-of' relationships? Give examples.

Question Eight: (8 Marks)

Design the class-frame for the object Book, determine its attributes and define several instances for this class. What is a facet? Give examples of various types of facets.

Suppose an expert given four conditionally independent evidences E_1, E_2, E_3 and E_4 creates three mutually exclusive and exhaustive hypotheses H_1, H_2 and H_3 . The following table illustrates the prior and conditional probabilities provided by the expert:

Hypothesis		Probability			
		$p(H_i)$	$p(E_1 H_i)$	$p(E_2 H_i)$	$p(E_3 H_i)$
$I=1$	$I=2$	0.40	0.3	0.8	0.5
		0.35	0.7	0.0	0.2
	$I=3$	0.25	0.4	0.5	0.7

If the evidences are observed in the order E_1, E_2 and then E_3 , compute the posterior probabilities for all hypotheses.

Institute of Statistical Studies and Research
Cairo University
Department of Computer Sciences

Intelligent Systems CS602
Final Exam
Spring 2009

Student Name:

Student ID:

Q		Grade
1	15	
2	15	
3	20	
4	30	
5	20	
	Total	

I. Knowledge Engineering

We are asked to build an advanced intelligent information system for keeping track on a hospital. It takes care of reception of patients, appointments, doctors, nurses, laboratory tests, and equipments.

As part of developing this system we acquire knowledge and build a knowledge base, including an ontology (or more), as part of adding intelligence to the information system. The knowledge should cover status of patients and their types, doctors and their specialties, departments of the hospital, appointments and their times, etc.

1) Acquisition Techniques:

State four (4) different knowledge acquisition techniques, for each of them state a situation, in the hospital system, in which you would use this technique to get the knowledge.

2) Representations Format

State four (4) different knowledge representations, for each of them write down two (2) examples of knowledge been acquired for the hospital system.

3) Building a Knowledge Acquisition Plan:

#	Knowledge Item	Source(s) of knowledge	Acquisition Technique(s)	Knowledge Representation
1	Who are the expected users of the system?			
2	Problems to be solved in the ongoing hospital system?			
3	Rules and regulations for setting appointments for patients?			
4	Rules of accepting a patient as in-patient			
5	Departments of the hospital and the specialties of nurses?			
6	Predicted size of hospital knowledge base?			
7	Billing of a patient?			

Comments and assumptions (if any)

II. Semantic Web Concepts

1) what are the following concepts:

a. XML:

b. HTML:

c. RDF:

d. OWL:

e. OIL:

f. URI:

g. URL:

h. W3C:

i. Protégé:

j. Prompt:

2) State four languages that are used in semantic web and build a diagram to show how they are related.

3) State a definition for Service Oriented Architecture and comment on how it is related to Semantic web

4) III. Discussion Issue

For future plans, we want to create a new concept, let us call it "Semantic Database." In this new concept the meaning of data items and their relationships are "known" to the management system in a way that allow better interpretation for data elements within the database as well as better understanding of queries.

This semantic database can extend database applications in more than one direction. First, we may think of a query that is able to extract answers from more than one database, whether they have the same schema or not. We may also think of extracting data that are created through different DBMSs. Second, we may think of a higher level of queries, such as natural language, or on the same line interpreting data results based on previously known meanings. Third, we may think of a mechanism through which the DBMS can check on inconsistencies or other semantic errors to guarantee integrity of the database.

- 1) Choose one purpose that is in your opinion should extend database applications.
- 2) Identify two challenges that you may face.
- 3) Assume that we will add a knowledge body to the system, what would be the purpose of the knowledge.

- 4) If we decide to construct Ontology to help in achieving your purpose, describe briefly what it would contain.
- 5) Suggest a structure for this Ontology.
- 6) Sketch a diagram showing the relationship between the management system and the Ontology.

7) Suggest an Ontology language and an Ontology development tool that can be used for your solution.

8) Do you think we can automatically extract knowledge from the data? If yes, what and how?

V. Research Paper

We have discussed papers on Text Mining and search based on content meaning. Imagine that we want to create a new concept on "image mining" and search based on image content, that is, I can give an image to the search engine and it recognizes what the image is about and can search and retrieve images that are related to the given one.

Try to describe a semantic based system that can achieve that.

Set challenges for such a system

How can Ontology and semantic concepts contribute to such a system.