

Academic Year: (2023 / 2024)

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Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: GALLARDO ANTOLIN, ASCENSION

Type: Electives ECTS Credits : 3.0

Year : Semester :

OBJECTIVES

The main goal of this course is to provide the students with the theoretical and methodological knowledge about algorithms and methods for multimedia information indexing and retrieval.

Upon successful completion of the course a student will meet the following competences:

1. GENERAL/TRANSVERSAL COMPETENCES:

- 1.1. Individual-work skills.
- 1.2. Capacity for analysis and synthesis.
- 1.3. Capacity to apply theoretical concepts to practice.
- 1.4. Skills related to group work and collaboration with other students.
- 1.5. Skills related to oral and written presentations.

2. SPECIFIC COMPETENCES:

- 2.1. Theoretical and practical knowledge about technologies and methods for information retrieval and indexing.
- 2.2. Theoretical and practical knowledge about multimedia information management systems: textual, speech, audio, image and video.
- 2.3. Capacity for designing systems for multimedia indexing and retrieval.

DESCRIPTION OF CONTENTS: PROGRAMME

The modern information overload problem caused by the availability of enormous amounts of information through internet makes it necessary to design systems that allow us to find the information we search and filter or personalize the information according to our needs. For that matter it is fundamental to be able to automatically index not only textual contents but also audio (music, speech, etc.) image or video, using methods based on the content or even collaborative tagging as the one taking place in social networks. Examples of these multimedia management systems are Google search (and all its variants as Google Image, Google Goggles, etc.), recommender systems and user profilers like those available in Amazon.

Unit 0. Introduction to Multimedia Information Management Systems

Unit 1. Multimedia Descriptors

Unit 2. Methods for Multimedia Retrieval and Indexing

- Project 1. Image Clustering
- Project 2. Decision Trees
- Project 3. Face Recognition

Unit 3. Multimedia Retrieval and Indexing Systems

- Project 4. Retrieval Information System

LEARNING ACTIVITIES AND METHODOLOGY

The course comprises two types of activities: lectures and laboratory exercises (projects).

LECTURES (1.5 ECTS)

Lectures provide an overview of the main theoretical concepts, mathematical and analytical tools for multimedia information retrieval and indexing.

LABORATORY EXERCISES (1.5 ECTS)

Laboratory exercises are designed for applying the theoretical concepts presented in the lectures. The students learn to apply different methods for multimedia retrieval and indexing and to interpret the results obtained from their computational work. The students are required to document properly their work and the results achieved through a written report.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	30
% of continuous assessment (assignments, laboratory, practicals...):	70

The assessment of the course will be based on the following criteria:

1. Exams: 30 %
2. Laboratory exercises: 70 %

BASIC BIBLIOGRAPHY

- C. D. Manning, P. Raghavan and H. Schuetze "Introduction to Information Retrieval", Cambridge University Press, 2008.
- H. M. Blanken, A. P. de Vries, H. E. Blok and L. Feng (Eds.) "Multimedia Retrieval", Springer, 2007.
- P. Perner "Data Mining on Multimedia Data", Springer Verlag, 2002
- R. Baeza-Yates and B. Ribeiro-Neto "Modern Information Retrieval" , Addison-Wesley, 1999
- S. Theodoridis and K. Koutroumbas Pattern Recognition, Academic Press 1999.

ADDITIONAL BIBLIOGRAPHY

- A. Hanjalic Content-based Analysis of Digital Video, Kluwer Academic Publishers, 2004
- C. D. Manning and H. Schuetze "Foundations of Statistical Natural Language Processing", The MIT Press, 1999.
- D. Jurafsky and J. H. Martin "Speech and Language Processing", Prentice Hall, 2008.
- G. G. Chowdury "Introduction to Modern Information Retrieval", Neal-Schuman Publishers (2nd ed.), 2003.