Intelligent System Project

(Part I - INTRODUCTION)

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Course 2018/2019
https://kemlg.upc.edu
PART 1 – INTRODUCTION
Contents (1)

- Introduction
  - Description of the aims of the course
  - Description of the team works
  - Information about the IS project timeline
  - Deliverables of the IS project
  - Examples of past ISP projects
Contents (2)

- Problem Analysis
  - Problem Feature Analysis.
  - Information/Data Analysis.
  - Viability Analysis.
  - Economic Analysis.
  - Environmental and Sustainability Analysis.

- Definition of the Intelligent System project issues
  - Definition of main goals of the IS project.
  - Definition of sub-goals.
  - Task Analysis.
Contents (3)

- Development of an Intelligent System Project
  - Data/Information Extraction
  - Data Mining & Knowledge Acquisition Process
  - Knowledge/Ontological Analysis
  - Planning and selection of Intelligent/Statistical/Mathematical Methods/Techniques
  - Construction of Models and implementation of Techniques
  - Module Integration
  - Validation of Models/Techniques. Comparison of Techniques
  - Proposed Solution
Contents (4)

- Intelligent System Project Output
  - PM1: Definition of the System Document
  - PM2: Midterm Document
  - PM3: Final Document & Software Delivery
  - PM4: Public Defense of the Project
Contents (5)

- Intelligent Methods and Models
  - Review of main Intelligent Methods available.

- Software tools
  - Review of main software tools available.
INTRODUCTION

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Aims of the course

- Development of an Intelligent System Project
- Design and construction of an Intelligent System to solve a non-trivial problem
- Integration and application of different knowledge acquired in previous Master courses for the solving of complex problems using Artificial Intelligence techniques.
- Writing and communication abilities of your technical and research work and achievements about Intelligent Systems both to a general audience and to a specialized audience
- Consolidation of team working abilities
Description of the Teamwork

- Assign a role to each member
- Select a team leader
- Maintain a Project Library including:
  - Documents
  - Project schedule (Gantt’s chart)
  - Project Time sheet
- Plan periodical teamwork discussions among members of the team
- Put high efforts in the Knowledge Acquisition process
Intelligent System Project Timeline

<table>
<thead>
<tr>
<th>Activity</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Formation</td>
<td>W1</td>
</tr>
<tr>
<td>Searching for a non-trivial problem</td>
<td>W2</td>
</tr>
<tr>
<td>Definition of the Project</td>
<td>W3</td>
</tr>
<tr>
<td>Definition of the Project Document (PM1)</td>
<td>W4</td>
</tr>
<tr>
<td>PM1 is due on: October 4(^{th}), 2018</td>
<td></td>
</tr>
<tr>
<td>Midterm Document (PM2)</td>
<td>W8</td>
</tr>
<tr>
<td>PM2 is due on: November 8(^{th}), 2018</td>
<td></td>
</tr>
<tr>
<td>Final Document and Software Delivery (PM3)</td>
<td>W15</td>
</tr>
<tr>
<td>PM3 is due on: January 15(^{th}), 2019</td>
<td></td>
</tr>
<tr>
<td>Public Defence of the Project</td>
<td>W15</td>
</tr>
<tr>
<td>PM4 on January 17(^{th}), 2019</td>
<td></td>
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</tbody>
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Deliverables of the IS Project (1)

- Definition of the Project Document (PM1)
  - Identification of a topic and a concrete problem
  - Relationship to other similar work/s
  - Specification of the goals of the project
  - Outlining of a strategy to achieve the goals
  - Preliminary Environmental & Sustainability Analysis
  - Preliminary Economic Analysis
Deliverables of the IS Project (2)

- Midterm Document (PM2)
  - Specifications of the Problem to be solved
  - Requirement Analysis of the System
  - Initial Architecture of the System
  - Proposed Solution Design
    - Initial Task Analysis
    - Methods and alternatives for each task
  - Initial Project Scheduling (Gantt diagram)
  - Software Prototype (if available)
    - Code
    - Executable object
Deliverables of the IS Project (3)

- Final Document and Software Delivery (PM3)
  - Executive Summary
  - User’s Manual
    - Description of the System’s purpose
    - Start-up/Shutdown of the system
    - Examples of use
    - Interactions of the system:
      - Input / output
      - List of Error messages
  - Technical/System Manual
    - Architecture of the System
    - Solution Design
      - Task Analysis
      - Methods implementing each task
Deliverables of the IS Project (4)

- Economic Cost Analysis
- Environmental & Sustainability Analysis
- Final Project Scheduling (Gantt diagram)
- The Project Time Sheet
- Final Software
  - Code
  - Executable object
Deliverables of the IS Project (5)

- Public Defense of the project (PM4)
  - Public Presentation Document (presentation slides)
Examples of Past ISP Projects (1)

2013/2014

- Analysing and interpreting tweets related to weather: talking about the past or about the future, making some sentiment/mood analysis
- Detecting talks about topics of interest related to some business in the Linkedin Network (WhoTalk)

2014/2015

- A prediction system for bike and spot availabilities (Bicing predictor)
Examples of Past ISP Projects (2)

2015/2016

- A recommendation engine for movies (BAGmovies)
- An Image Search Engine based on Artistic Style
- PCC - Parrot Communication with children - An intelligent interaction system for children with difficult emotion expressing skills, through a flying drone with camera

2016/2017

- PartnerTIP: Online dating system based on "vk.com"

2017/2018

- Robust Euro Notes Classification (Adversarial Attack-Defense)
- Meeting the right people
- A Classification System for fictional stories
Analysing and interpreting tweets related to weather: talking about the past or about the future, making some sentiment/mood analysis

Our objective is to create a system capable to analyze tweet data related to weather. By analyzing we really mean that the system should be able to understand some of the information in the tweet.

This information is clustered into three tasks:

• The first main task we want to be able to do is to detect when the information of a tweet happened: is the tweet talking about the past, the present or is it making a prediction?

• The second task is to understand if the tweet is positive, negative or neutral. This task is usually referred as sentiment or mood analysis.

• The third and last task is to infer what kind of weather is a tweet referring to. Is the tweet talking about the rain, wind etc...
Detecting talks about topics of interest related to some business in the LinkedIn Network (WhoTalk) (1)

Interview with the client (user)
Taking requirements
Definition of scope and risks
Access to customer data (Books / Keywords / LinkedIn profile)

Books analysis
Preprocessing of the books
Implement frequency algorithms
Frequency analysis of keywords (keywords Client)
Implement the feature extraction algorithm (keywords)
Extraction of features
Frequency analysis of the extracted keywords
Make Collecting of keywords / frequency

Database creation
Definition of structure
Create database
Populate Database

Creation and Analysis of classification algorithms
Study the proposed classification algorithm (antispam methods)
Algorithm implementation
Training the Algorithm
Testing the Implementation
Testing the Algorithm
Detecting talks about topics of interest related to some business in the LinkedIn Network (WhoTalk) (2)

Creation of Service RESTful (Server / BackEnd)
- Install Server
- Creating restful structures
- Creating the Rest service
- Implementation of the service in server
- Integration with LinkedIn Api
- Implementation of Algorithm for periodic reading the LinkedIn comments of user's contacts

Creation of FrontEnd
- Layout of the Front
- Creation of MobileFirst App
- Creation of Restful front structure
- Integration with LinkedIn Api
- Integration with Restful Server (app server)

Management and monitoring
- Prepare documentation
- Track project stages
- Continue Communication with client
A prediction system for bike and spot availabilities (Bicing predictor)
A recommendation engine for movies (BAGmovies)

Problem we solve

LIFE IS SHORT
DON'T WATCH CRAP

- MOVIES
  - 100
- SERIES
  - 47
- IN THEATERS
  - 24
- CRAP MOVIES
  - 151
- BEST RATED
  - 859
- WHAT DO YOUR FRIENDS WATCH?
  - 0

PICK WHAT TYPE OF MOVIES OR SERIES YOU WANT TO WATCH

- more than 30,000 TV channels and 50,000 new movies a year
- where to watch them legally?

BAGmovies.com

© Miquel Sànchez i Marrè, KEMLG, 2016
A recommendation engine for movies (BAGmovies)

Solution Design - an Hybrid Engine

- top-reviewed
- tag-based
- associative filtering
- collaborative filtering
A recommendation engine for movies (BAGmovies)

Functional Architecture of the Intelligent System

1603 signed users, 17829 reviews and 30000 movies
Problem Definition

- Information retrieval is a crucial and non-trivial task for today’s requirements
- The biggest image search engines are based on Text in web pages or specific features
- The need for better and accurate images related to given topics is increasing every day (Marketing, Design, Presentations, etc)
- Users are interested in searching for images based on non objective features: feeling, emotion -> style
An Image Search Engine based on Artistic Style

An image search engine based on Artistic Style

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An Image Search Engine based on Artistic Style

Functional Architecture
PCC - Parrot Communication with children - An intelligent interaction system for children with difficult emotion expressing skills, through a flying drone with camera

Aim of this Project

The Problems

- Deaf/autistic children have difficulties in communication
- Find new way to interact with them and express emotions.

The Objective

Be able to communicate with children
Parrot will react according the input doing some action or “dancing”.
PCC - Parrot Communication with children - An intelligent interaction system for children with difficult emotion expressing skills, through a flying drone with camera

System Architecture
PartnerTIP
Online dating system based on "vk.com" (1)

- The Problem
  - It is not common for the applications based on the social networks to use the combined information from several accounts to provide an analysis of relation with the other members of the platform.
  - The most popular social network are able to suggest to the possible friends using the information about the 'friends of friends'.
  - In the dating recommendation problem the information about user preferences is not contained in the relations itself with the exception of relationship status.
  - The dating recommendation application based on the relationship information is thus a challenging, and at the same time interesting problem from machine learning point of view and from the point of view of the user interest.
PartnerTIP
Online dating system based on "vk.com" (2)

● The Solution

■ Our team approached the problem of *dating recommendation* system with a preliminary analysis of prediction power of classification models in this type of tasks.

■ The result of the project is an implementation of a *recommendation system* in a form of a *web application* called **Partner-Tip**.

■ The application uses the *social network relationships* of the user friends and calculate the recommendation score with all the friends of opposite sex.
PartnerTIP
Online dating system based on “vk.com“ (3)
Robust Euro Notes Classification
(Adversarial Attack-Defense)

- The Problem
  - Main objective of the project is to build a robust intelligent system that counts money, by classifying images of euro banknotes, even when exposed to adversarial attacks.
  - Making good classifier is not enough today, it has to defend itself from malicious agents that try to manipulate with data.
Robust Euro Notes Classification
(Adversarial Attack-Defense)
Meeting the right people

- The problem:
  - Help every attendee of an event to connect with the right people in an efficient, time saving and personal manner.

- The solution:
  - The approach has both, an offline section, which takes the profile information of each attendee, process it and calculate similarities between each pair of attendees.
  - The online section which is a web application, including a chatbot integrated in it. The web application will be the main interface with the user/attendee, and it will recommend people to meet with, to each attendee of the event.
Meeting the right people
A Classification System for fictional stories

- The problem:
  - Text classification applied to an on-line book-store:
  - Writers upload their stories on the on-line platform
  - Unordered arrangement of stories
  - Not automatically grouped
  - Inefficient access to stories
A Classification System for fictional stories

- The solution:
- A classifier system able to do the following was constructed:
  - Automatically categories stories
  - Improved and optimized accessing of stories
  - Stories are arranged orderly
A Classification System for fictional stories

Diagram:
- Data
  - Preprocessing
    - Feature selection
      - Training
        - Model
          - Category
            - List of relevant books
- New book example
- Query
  - Preprocessing
    - DB
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