The aim of this course is to train students in understanding the techniques and tools for describing social networks and www. The course will teach techniques for ranking (ex. google’s pagerank for web pages), recommender systems (ex. amazon’s recommendations of similar products), Auctions of advertisements (i.e. google’s adwords), Finding influencers in social networks, finding communities in social networks, finding text similarity between documents by meaning (i.e. similarity between posts in blogs).

Prior skills

Having passed the semester 2b

Requirements

Knowledge of linear algebra and probability

Teaching methodology

blackboard classes and individual work

Learning objectives of the subject

Teaching staff

Coordinator: Enric Monte Moreno

Others: Enric Monte Moreno

Prior skills

Having passed the semester 2b

Requirements

Knowledge of linear algebra and probability

Teaching methodology

blackboard classes and individual work

Learning objectives of the subject

The aim of this course is to train students in understanding the techniques and tools for describing social networks and www. The course will teach techniques for ranking (ex. google’s pagerank for web pages), recommender systems (ex. amazon’s recommendations of similar products), Auctions of advertisements (i.e. google’s adwords), Finding influencers in social networks, finding communities in social networks, finding text similarity between documents by meaning (i.e. similarity between posts in blogs).

Study load

<table>
<thead>
<tr>
<th>Total learning time: 50h</th>
<th>Hours large group: 20h</th>
<th>40.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self study: 30h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
### Content

| **Ranking Systems.** | **Learning time:** 10h  
Theory classes: 4h  
Self study : 6h |
|----------------------|-------------------|
| **Description:**  
Description algorithms for sorting websites by relevance. Algorithms for graphs made of links between pages: Pagerank and HITS.  
**Related activities:**  
Individual Deliverable  
**Specific objectives:**  
Understanding google's Pagerank and HITS equations from different points of view; flow graph, random walk, probability of visiting a node. |

| **Recommender systems** | **Learning time:** 10h  
Theory classes: 4h  
Self study : 6h |
|-------------------------|-------------------|
| **Description:**  
Description of the recommender systems based on Collaborative and content based. Description of different recommender systems; amazon, netflix, facebook.  
**Related activities:**  
Individual Deliverable  
**Specific objectives:**  
Be able to adapt the general methods of recommender systems to specific situations. |

| **Auctions of web advertisements** | **Learning time:** 10h  
Theory classes: 4h  
Self study : 6h |
|-------------------------------|-------------------|
| **Description:**  
Description of systems for making auctions of online advertisements. Summary of the modified Vickrey auction system used by google's adwords.  
**Related activities:**  
Individual Deliverable |
230322 - STSN - Statistical Tools for Social Networks and the Www

Social Networks as graphs

**Description:**
Techniques for finding influencers and communities in graphs. Specific properties of twitter type graphs and facebook type graphs.

**Related activities:**
Individual Deliverable

<table>
<thead>
<tr>
<th>Learning time: 10h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

Finding text similarity between documents by meaning

**Description:**
Bag of words model for texts, stemming and word-term matrix. Latent semantic analysis

**Related activities:**
Individual Deliverable

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

Qualification system

Individual assessments: 40%
Final examination: 60%

Bibliography

**Basic:**