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***USER MANUAL***  
***GALLITO 2.0***  
64bits

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# 1. INTRODUCTION

The aim of this document is to explain how Gallito 2.0 works. Gallito is a tool suitable for two domains:

Research:

Makes it possible to process language samples and extract samples for psycholinguistics experiments, such as term entropy, frequency measured through vector length, similarity between terms, lists of semantic neighbors. All of this is very useful to exercise experimental control or even to do research into the effect of this kind of variables on processing.

Technology:

For text categorizers in any domain. In fact, Gallito 2.0 is currently being used as the first module in cloud applications that categorize customer service calls. It can also be used to visualize useful information for marketing departments.

The functionality associated with this application is:

Creation of semantic-vectorial spaces from texts

- Calculation of term significance functions (Entropy or IDF)
  - Calculation of vector norm for every term
  - Lists of semantic neighbors of a term
  - Similarity between terms
  - Similarity between existing documents
  - Similarity between documents that do not exist in space (pseudodocuments)
  - Batch processes (similarities, graphs, neighbors)
  - Matrix output in plain text
  - Pajek format output for term visualization
  - Essay evaluation
  - Text Cohesion (sentence-sentence, paragraph-paragraph, etc)
  - Dimensions Interpretation
-

## 2.INSTALLATION

### 2.1.Requirements

In order for Gallito 2.0 to work properly the following components must be installed (they are included in the installation CD and can be downloaded from the Microsoft website):

- **Windows 64 bits operating system (Windows 7 or Windows Server)**
- **Microsoft SDK 4**, included in the installation CD
- **Microsoft Visual C++ 2010 Redistributable Package (64bits)**
- **Writing permissions to write in the installation directory**

Some knowledge of Latent Semantic Analysis (LSA) and its applications is also required.

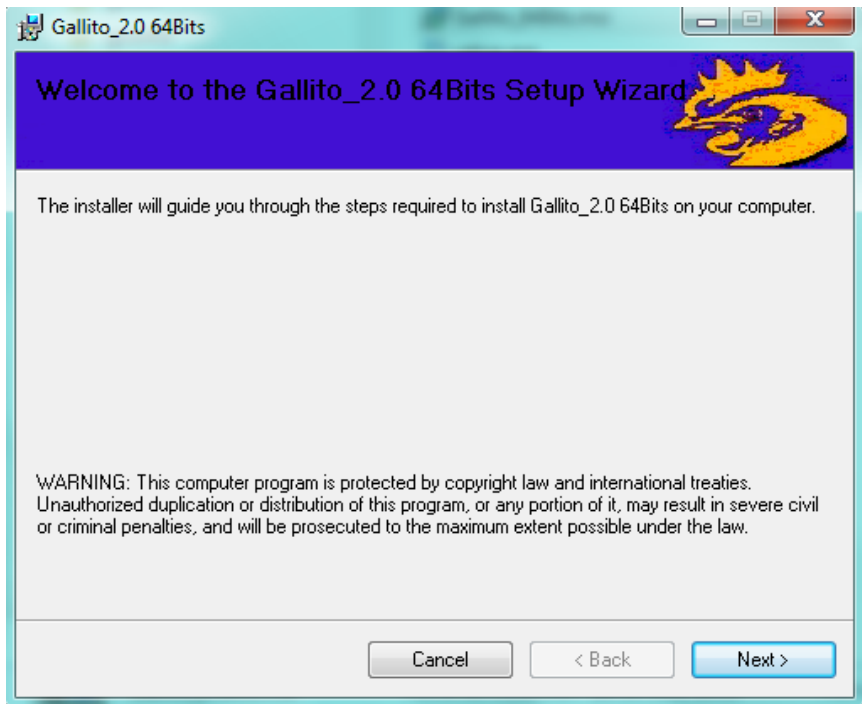
### 2.2. Installation procedure

- Access the installation folder and execute the Setup.exe program.
- The following screens will appear to guide you through the installation process:

#### 2.2.1. Step one

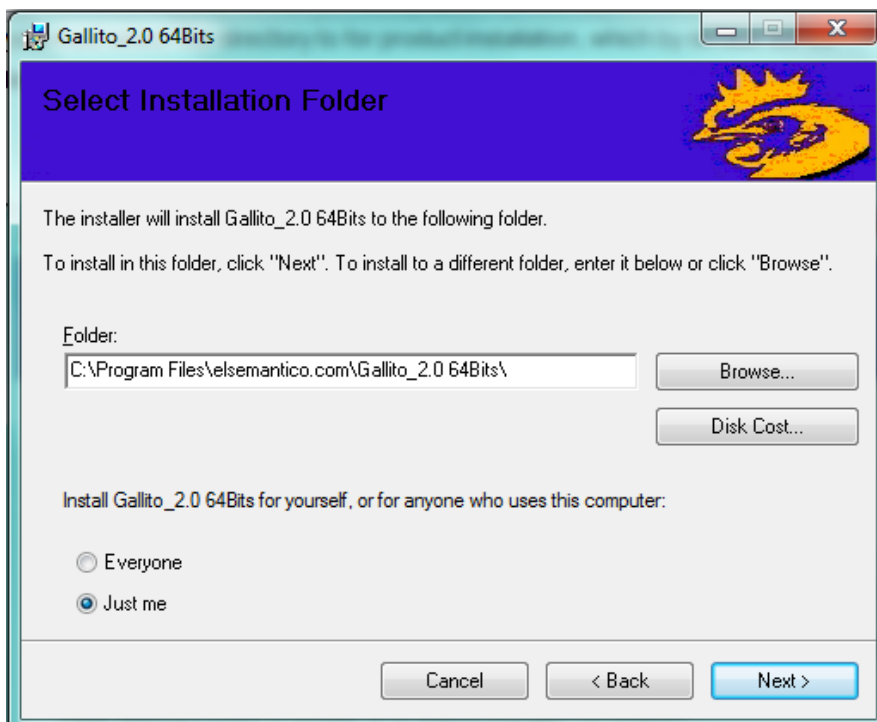
Welcome screen to product installation, specifying the product to be installed (Gallito 2.0). Click NEXT to continue installing or CANCEL to exit the installation process.

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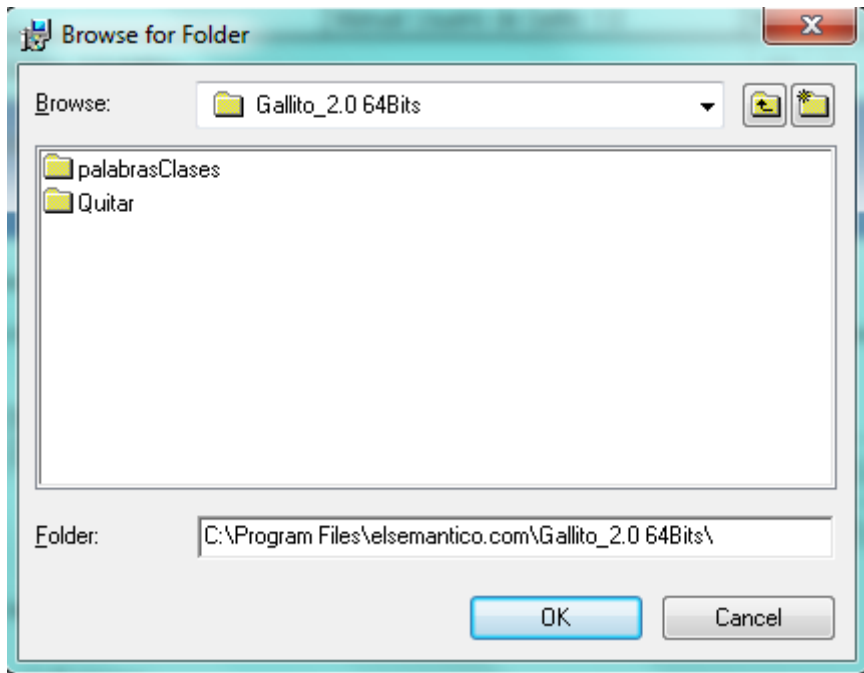


## 2.2.2. Step two

In this screen you must select the directory to for product installation, which by default will be C:\Program Files\elsemantico.com\Gallito\_2.0 64Bits\



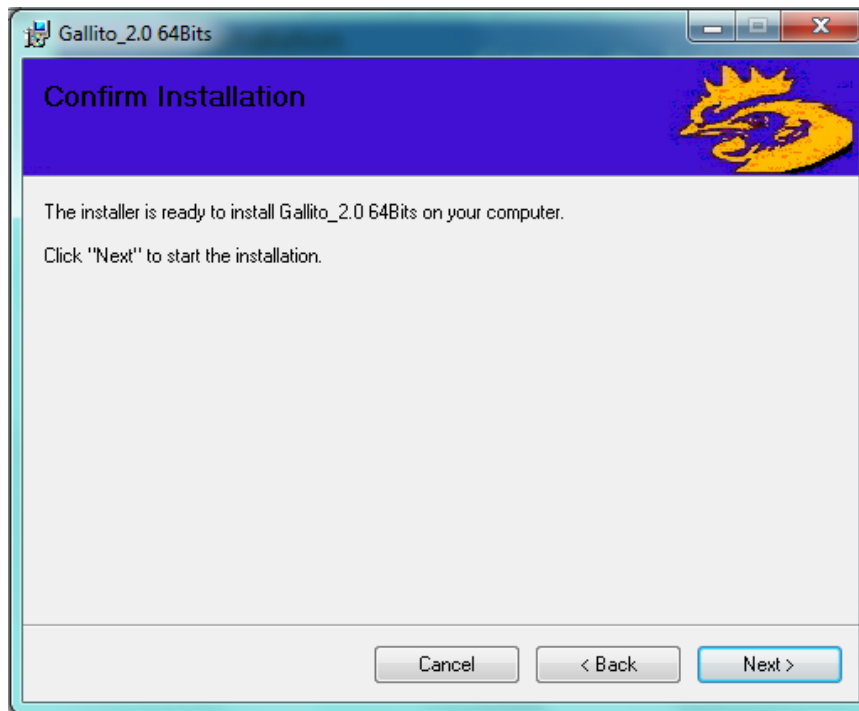
If you want to install the product in a directory other than the default directory, select it by clicking BROWSE in the installation window. Clicking this button you will access to a standard Windows directory browser, through which you will be able to select the directory where you want to install Gallito 2.0 (see following image).



Once you select the installation directory, click NEXT to continue the installation process.

### 2.2.3. Step three

In this step the user is warned that clicking NEXT will launch product installation. If you click BACK, you will be able to re-enter the installation information.



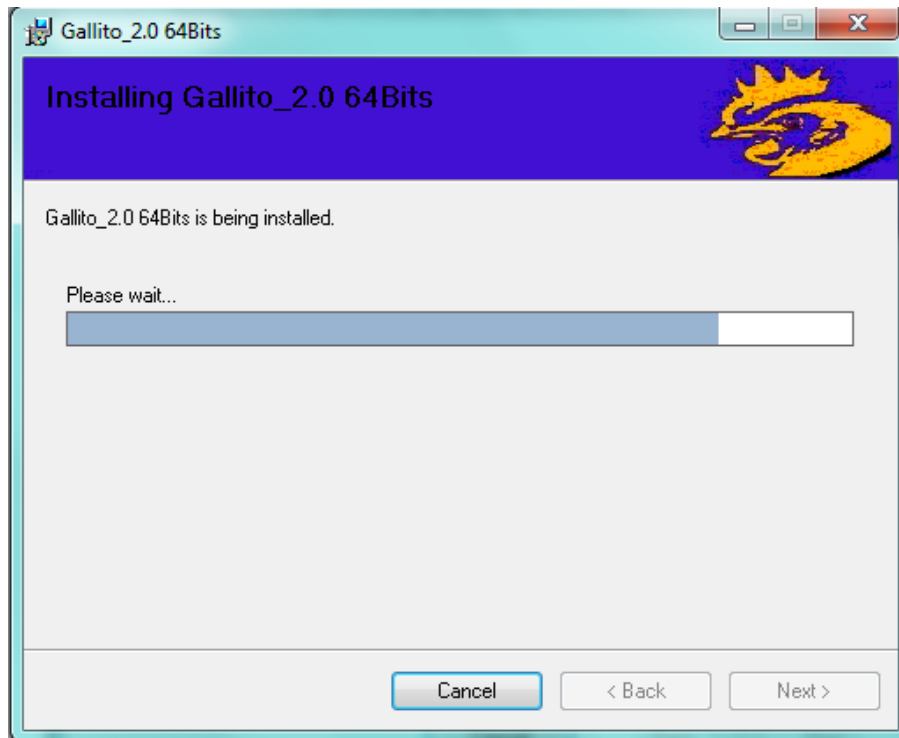
#### 2.2.4. Step four

The window shows installation progress as a percentage and the files being copied to the machine on which the product is being installed.

Once the installation process is 100% complete, you will access the next step (see next section) after being informed that the necessary information for the application to work correctly has been entered.

Clicking CANCEL in the progress window halts the installation process.

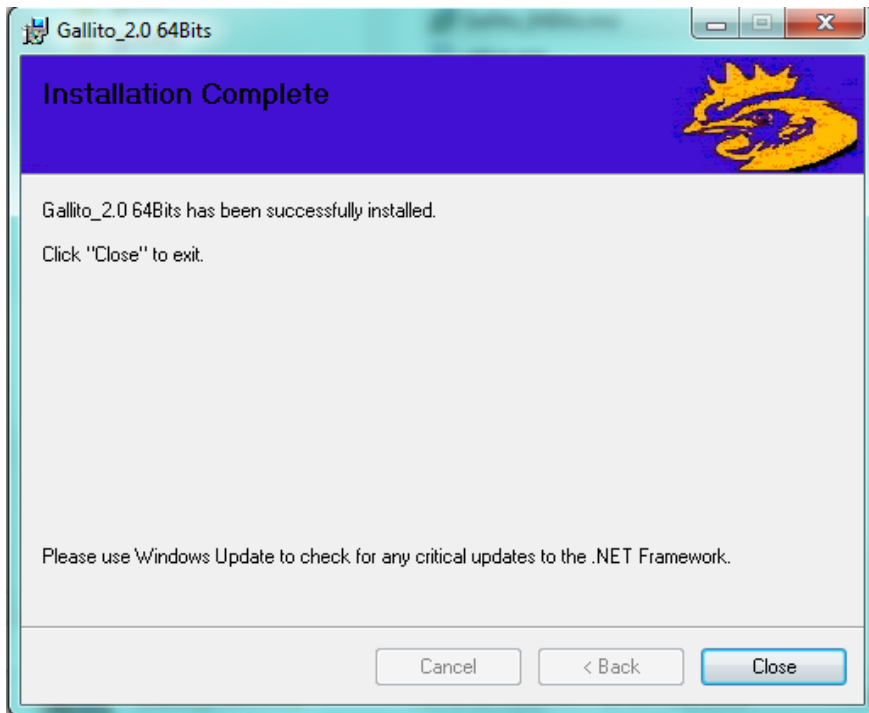
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#### 2.2.5. Step five

End of the installation. This screen lets the user know that product installation is complete. By clicking on FINISH you will access the last screen in the installation process.





### 3. SUMMARY OF POSSIBLE ACTIONS

The application makes it possible:

- To generate semantic spaces under various parameters.
- To find the similarity between terms, documents, and pseudodocuments.
- To generate lists of neighbors under various parameters (with the possibility of exporting them to Microsoft Excel).
- To load and save semantic spaces in different formats.
- To generate .txt files from significant matrices.
- To batch process (neighbors, similarity by pairs, similarity matrices)

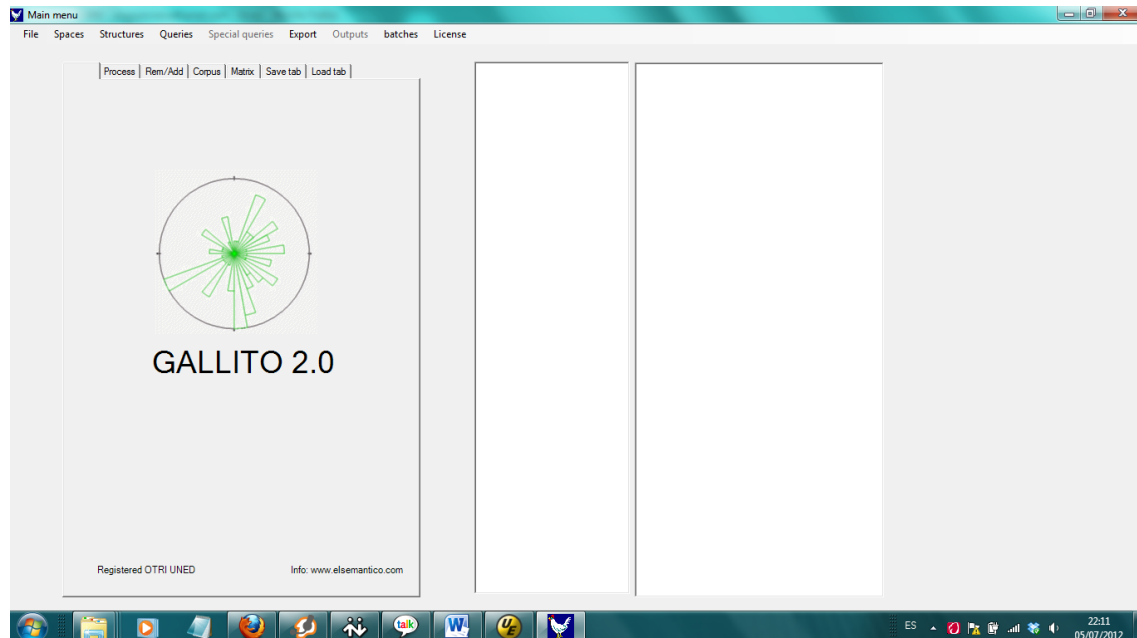
To do this, the application has a single form or control panel with tabs and drop lists. The application has two basic functionalities:

- Generation of a semantic space.
  - Operations on a semantic space (Calculate Similarities, Save Space, Load Space, etc.)
-

## 4. APPLICATIONS

When the application is launched, a small presentation is deployed, followed by the control screen. From then on, you can create a new semantic space or load an existing space that has been saved in the hard disc.

The screen that appears is the following:



You can start to perform operations using the tabs and drop lists.

### 4.1 Creating a semantic space

To create a semantic space, a corpus is needed. This corpus will be called “reference corpus” and will be a text plain file (.txt extension). The contextual window can be separated by a character or simply by natural-language sentences. In the former case, the separating character (usually “#”) have to be between two documents:

Los archivos planos constituyen la forma más básica de una base de datos

#

Los archivos planos incluyen un campo por cada uno de los elementos que se desean contemplar

#

La redundancia de elementos es una característica de estos archivos

#

La base de datos relacional soluciona la redundancia en los datos

#

Son frutos largos y con sabor

#

La recogida será buena si ha tenido una buena base como semillero

#

Los frutos son de color verde

#

En la recogida es parecida a los demás frutos largos

#

In the second case, a well-established sentence dot separation is mandatory but a special format is not needed.

To create a semantic space, the following parameters are required:

- **No. of dimensions or Accumulated singular value:** The number of dimensions must not surpass the total number of documents. The accumulated singular value is expressed as a percentage (with no “%” sign). This percentage reflects the saved dimensionality, that is to say, the dimensionality percentage that will be maintained. In this way, 40% refers to the number of dimensions corresponding to said dimensionality. In extremely large corpora, it will not be possible to calculate this percentage, and so 300 dimensions will be used. These data are entered in the matrix tab in the central panel.
-

Matrix features

Dimensions

Accumulated singular value

- **Linguistic adjustment:** This option refers to the significance calculation for every corpus term. Log-Entropy or log-IDF can be selected, as well as the absence of these calculations. This information is entered in the matrix tab in the central panel.

Linguistic adjustment

Log \* Entropy

Log \* IDF

No aplicar ajuste

- **Normalizing the U Matrix:** The U matrix (of terms) extracted in the SVDF process is normalized before weighting it applying the weight of each dimension. In this way the effect of term frequency is countered. This information is entered in the matrix tab in the central panel.

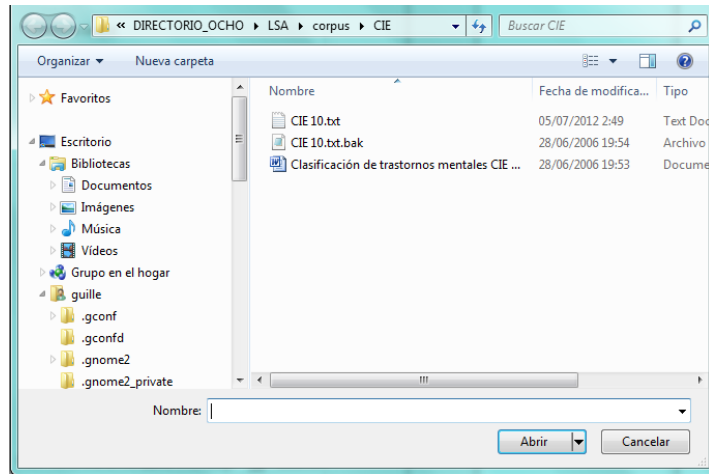
Normalization

Normalizing the U Matrix

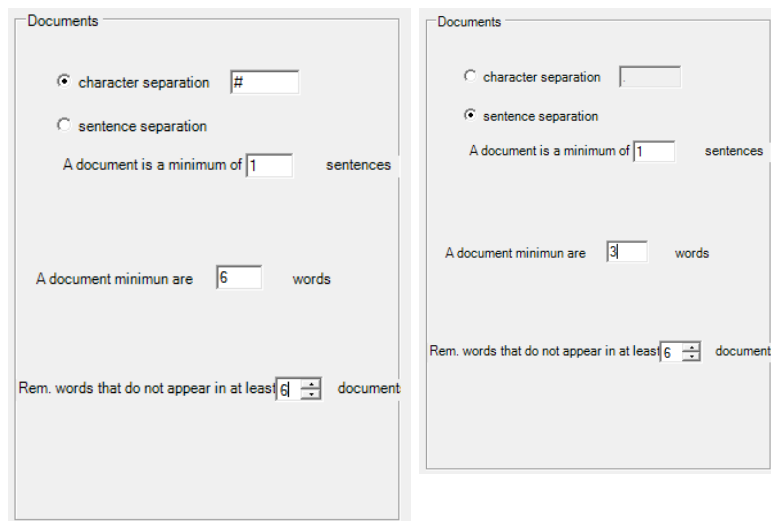
- **Reference corpus:** the path of the text file where the linguistic corpus is stored (in a legitimate format). Click on the button to browse through the directories. This information is entered in the Corpus tab in the central panel.

Reference corpus

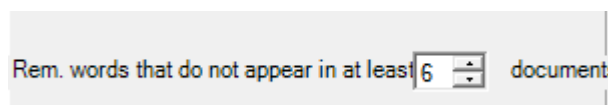
The chosen corpus can be selected in the standard Windows browser.



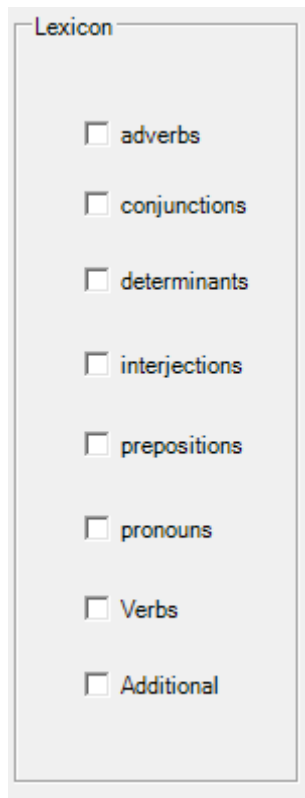
- **Document separation:** The documents can be separated by a character or simply by natural-language sentences. In the former case, by the separating character (usually “#”). In the second case, the number of sentences constituting a document (usually 1) should be established. This information is entered in the Corpus tab in the central panel.



- **“A document is a minimum of ... words”:** This is the minimum number of terms for a document to be analyzed. This information is entered in the Corpus tab in the central panel.
- **“Remove words that do not appear in at least ... documents”:** The minimum number of documents in which a specific term must appear to be included in the analysis. This information is entered in the Corpus tab in the central panel.

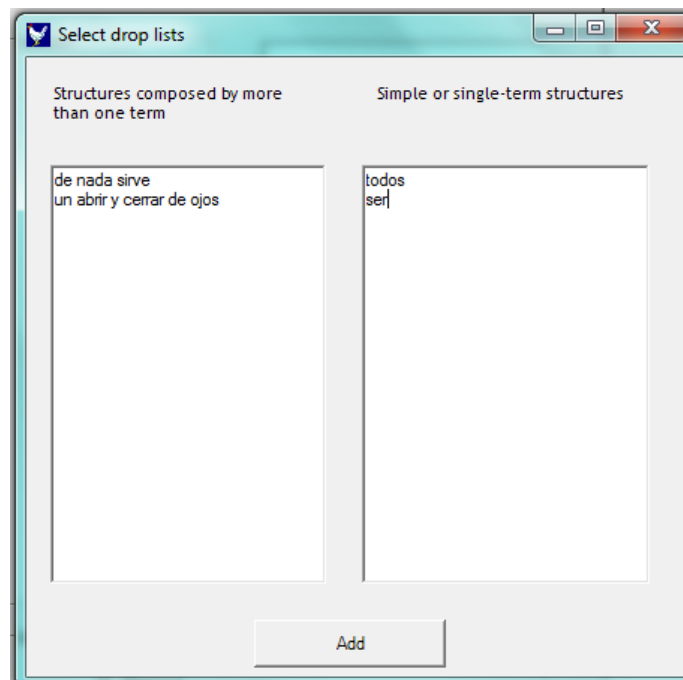


- **Remove:** Literal occurrences of each of the structures presented are removed. This information is entered in the Remove tab in the central panel.

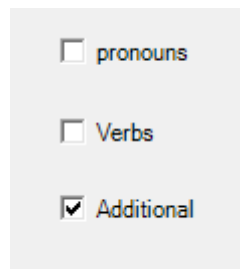


- **Generating a “stop list”:**

1) In the Structures > Select drop lists, select and enter the structures that you wish to remove. In the left-hand side, you will find the structures composed by more than one term. In the right-hand side, you will find simple or single-term structures.



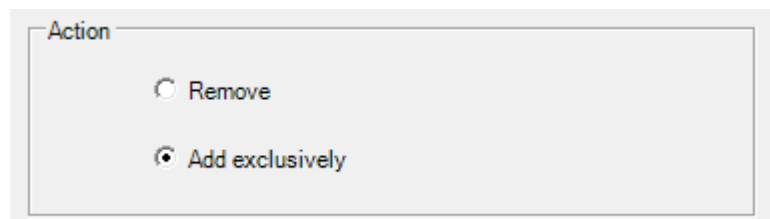
2) In the Remove tab, check the “Additional” box



pronouns  
 Verbs  
 Additional

- **Creating a space with only one “go list”**

The procedure is similar to the previous one. In the Remove tab the “Additional” box is checked and in Structures > Select the structures in the “go list” are selected. The “Add exclusively” option must also be checked.



Action  
 Remove  
 Add exclusively

Using this method you can select the remaining structures so that they are included in the analysis: for instance, an analysis with function words and adverbs and the selected additional structures. This information is entered in the Remove tab in the central panel.

- **Replace terms by classes:** To reduce the variability of some words, it can sometimes be interesting to include terms in categories and use those categories as terms. For instance, all mobile telephone brands could be included in the ClassMobile category. In this way, in the process both Nokia and Alcatel would be treated as the ClassMobile term, whose occurrences would increase. This information is entered in the Remove tab in the central panel.
-



#### Classes

Replace terms by classes

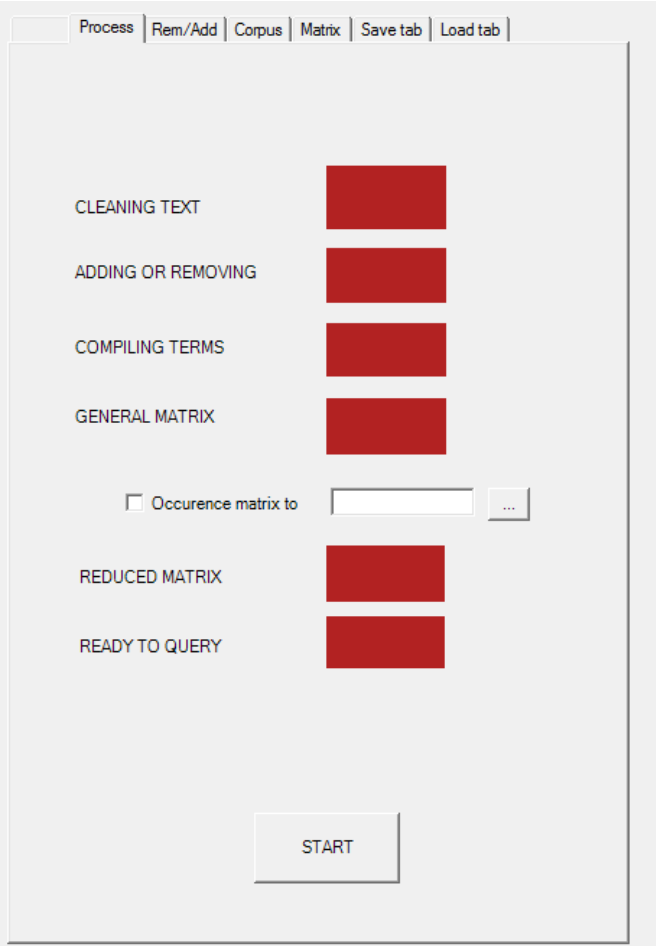
Class definition would be included in classes.txt in the directory.

C:\Program Files\elsemantico.com\Gallito\_2.0 64Bits\palabrasClases

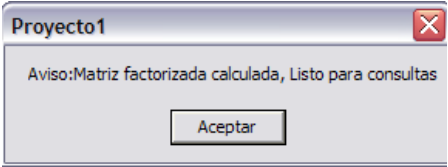
If you want to load that has been previously processed using class definitions, it must be specified in the Load tab. The definitions used in the classes.txt must be provided.

Load classes list

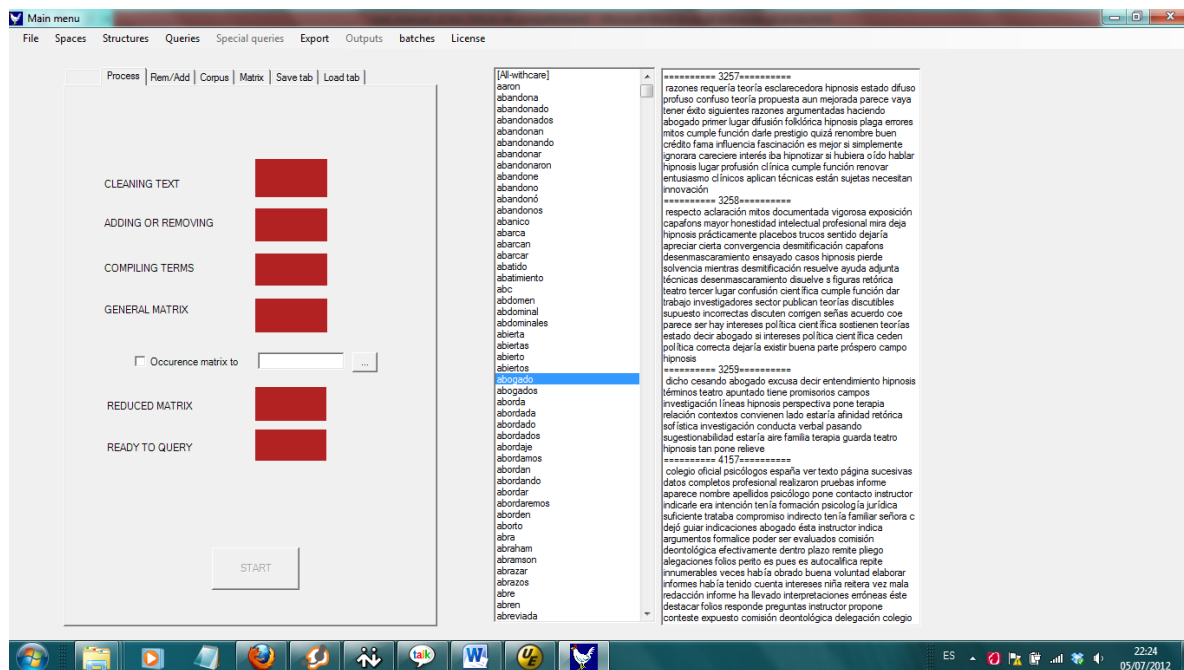
Once the parameters for corpus creation have been selected, open the Process tab and click on Start. Then the processes will be highlighted as they are executed. The total process can be slow and may even take days, depending on the options and the text corpus.



The final process ends with the following message:



Once this warning is accepted, terms and documents will be loaded on the right-hand side and it will be possible to perform operations on the semantic space.



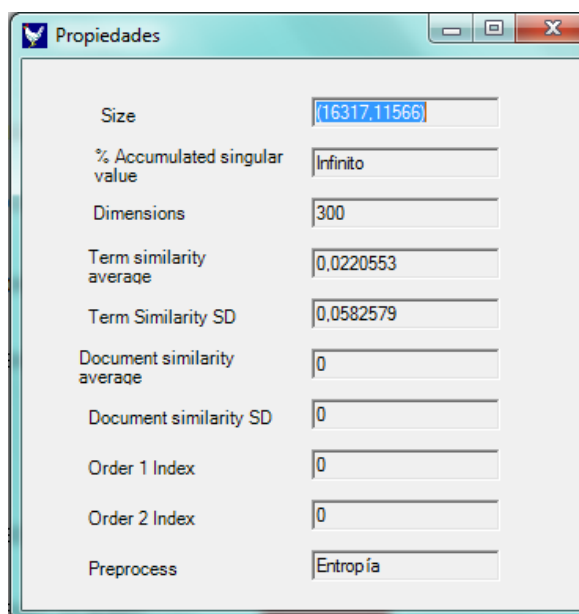
## 4.2 Operations on semantic spaces

Once a semantic space is created and loaded, operations can be performed on it.

These operations can be: comparing two terms, comparing two documents identified by a number, comparing two free texts entered by the user, extracting semantic neighbors (with simple or corrected cosines or with simple or corrected predication). The space can also be saved in a hard disc directory to be loaded at another time.

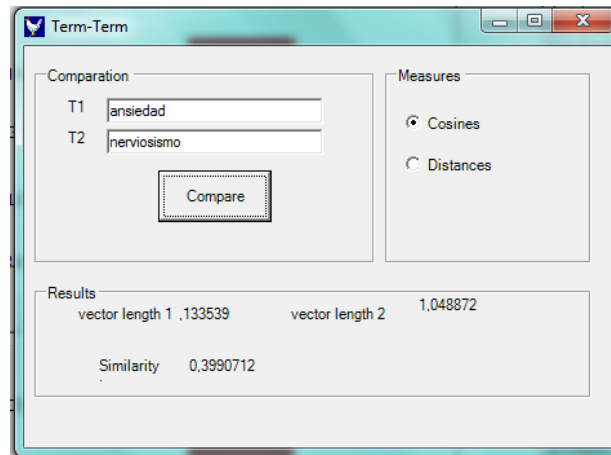
**Space properties:** In this option, the properties of the spaces on which the user is working can be viewed. Some of the indices will be disabled in the applications aimed at large linguistic corpora.

Space>Properties



**Comparing two terms:** Two specific terms can be compared by means of their cosine or the Euclidean distance between them.

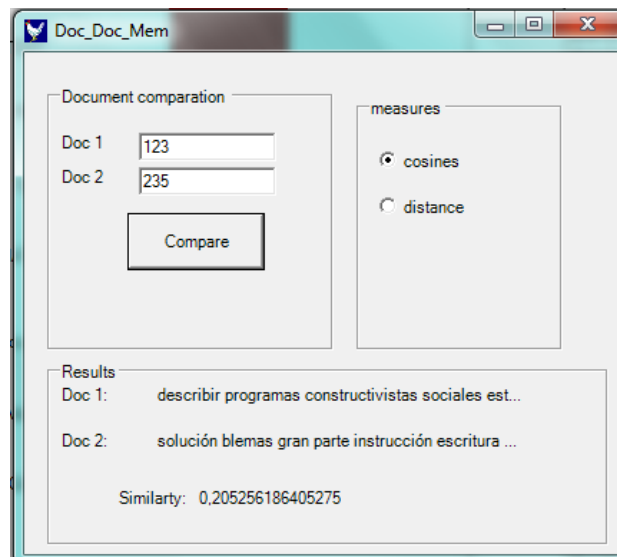
Queries > Term-Term



The screenshot shows a window titled "Term-Term" with a light blue border. It is divided into three main sections. The top-left section, labeled "Comparison", contains two text input fields: "T1" with the value "ansiedad" and "T2" with the value "nerviosismo". Below these fields is a "Compare" button. The top-right section, labeled "Measures", contains two radio buttons: "Cosines" (which is selected) and "Distances". The bottom section, labeled "Results", displays the following information: "vector length 1 .133539", "vector length 2 1,048872", and "Similarity 0,3990712".

**Comparing two documents identified by a number:** Two specific documents can be compared by means of the cosine or the Euclidean distance between them.

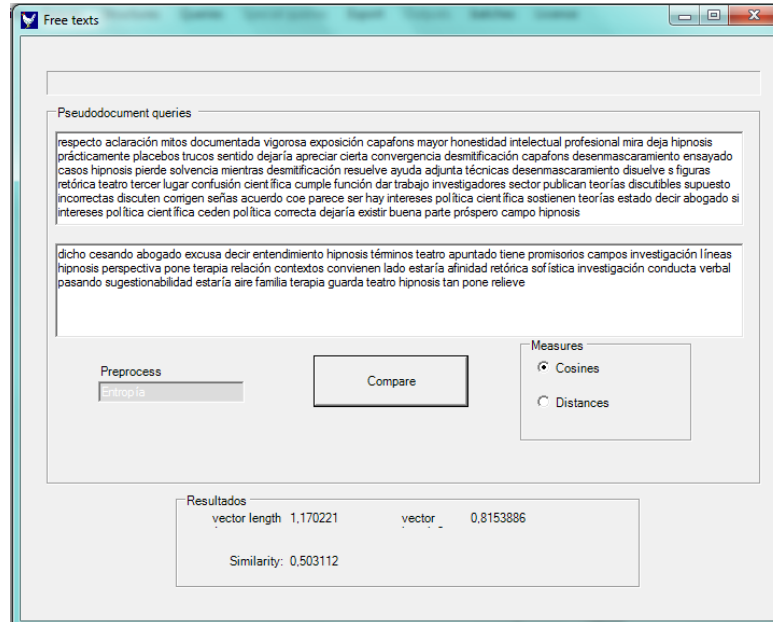
Queries > Document-Document



The screenshot shows a window titled "Doc\_Doc\_Mem" with a light blue border. It is divided into three main sections. The top-left section, labeled "Document comparison", contains two text input fields: "Doc 1" with the value "123" and "Doc 2" with the value "235". Below these fields is a "Compare" button. The top-right section, labeled "measures", contains two radio buttons: "cosines" (which is selected) and "distance". The bottom section, labeled "Results", displays the following information: "Doc 1: describir programas constructivistas sociales est...", "Doc 2: solución blemas gran parte instrucción escritura ...", and "Similarity: 0,205256186405275".

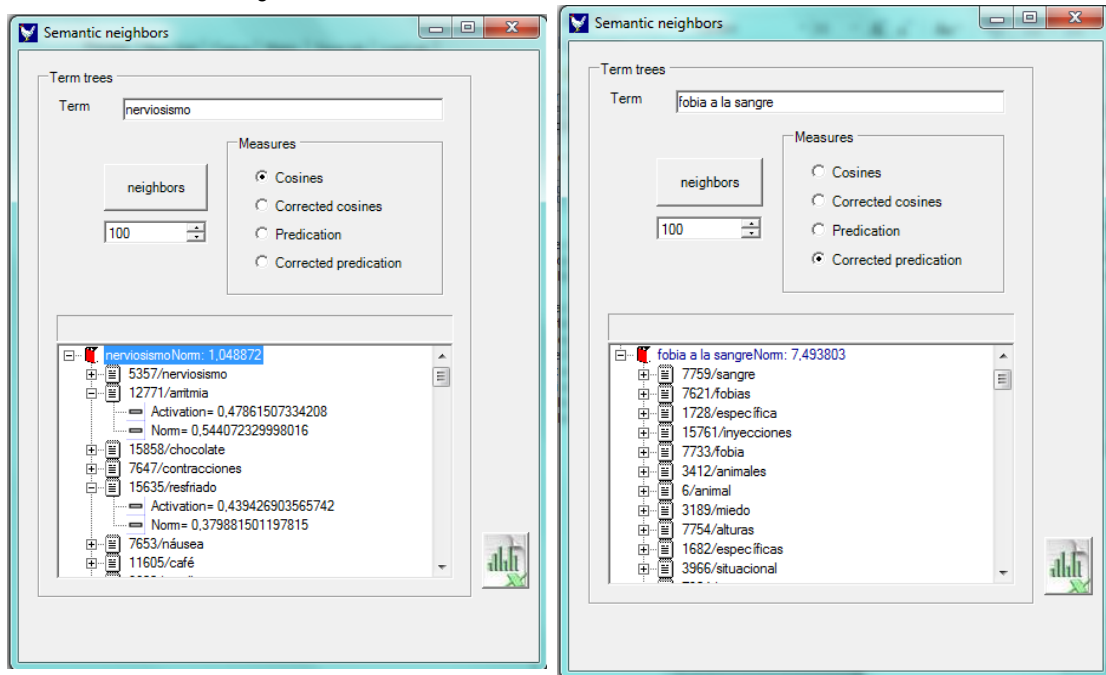
**Comparing two freely produced texts:** Two free texts can be compared by means of their cosine or the Euclidean distance between them. (In large-size spaces this process will take a few seconds. Process progress will be shown by means of a status bar).

Queries > Free texts



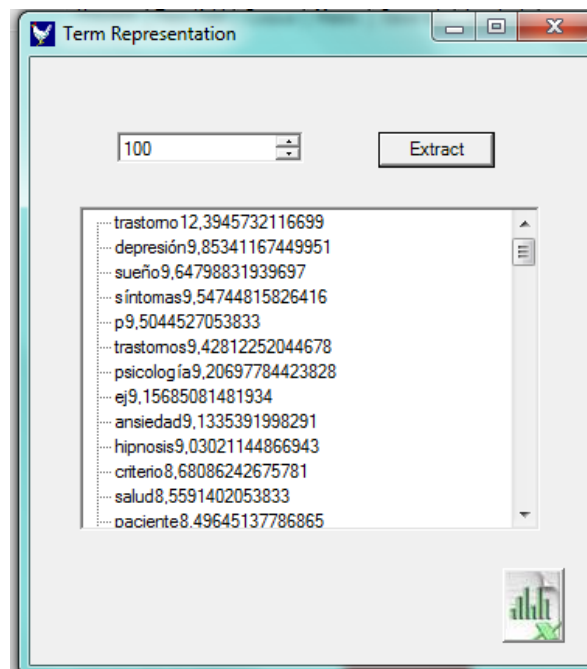
**Extraction of semantic neighbors:** The semantic neighbors of a specific term are extracted by various methods (cosines, corrected cosines, predication, corrected predication). Neighbor trees will be displayed as term neighbors are extracted. In addition, the number of neighbors to be extracted can be selected. The results can also be exported to Microsoft Excel.

### Queries > Semantic neighbors



**Extraction of the most representative terms in the semantic space:** The semantic neighbors of specific terms can be extracted by various methods.

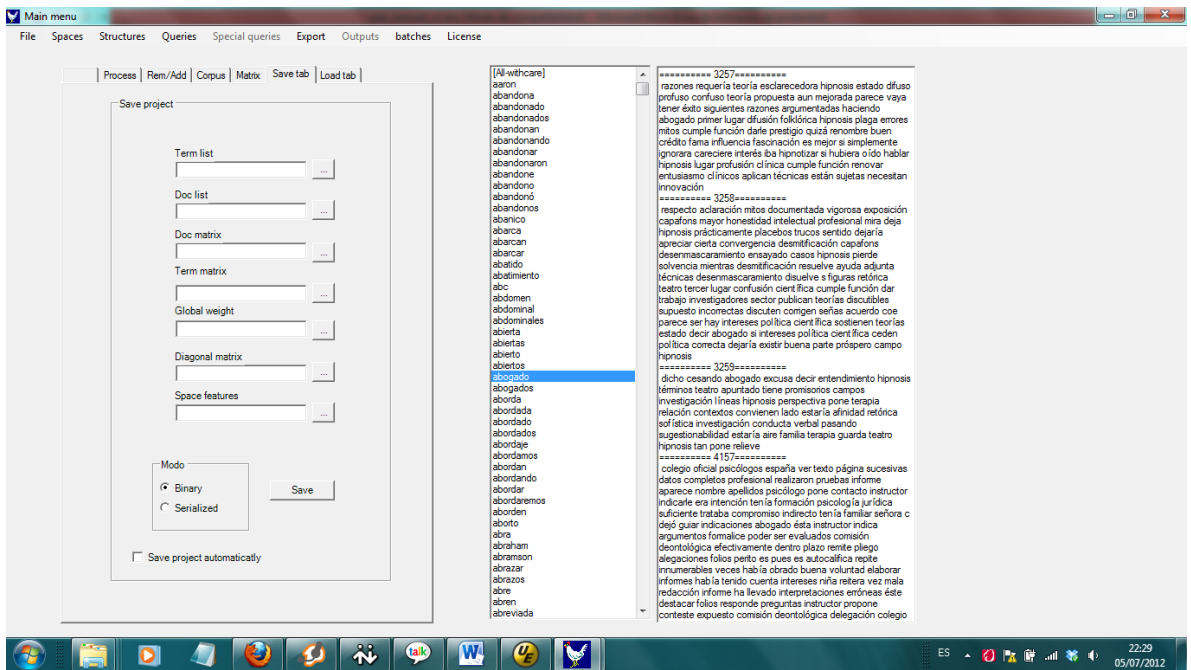
Queries > Representation



**Saving a semantic space:** A semantic space can be saved in the hard disc and reloaded when necessary with no need to creating it against.

#### Save tab

Then a name and path to save 7 variables must be selected. We recommend that you save all spaces in the same directory, which can be created in the same directory browsers as each of the variables., At the end, select the format (we recommend “binary”) and click on Save.

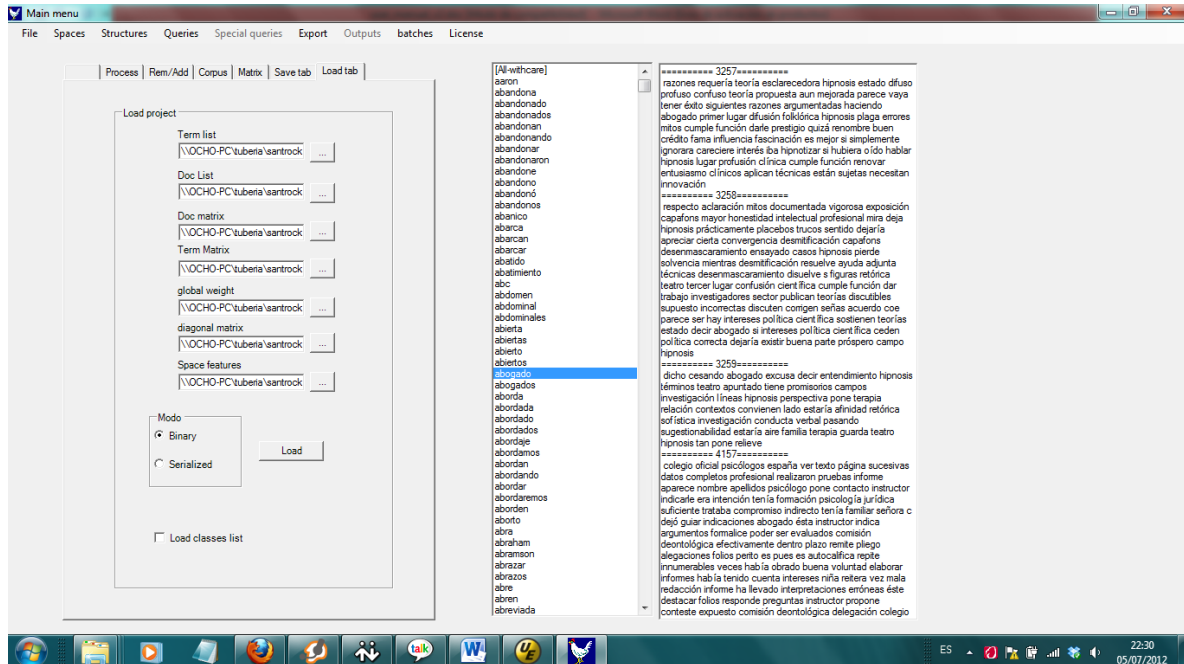


*Loading a semantic space. In the same way, a semantic space can be loaded from the hard disc with no need to create it again.*

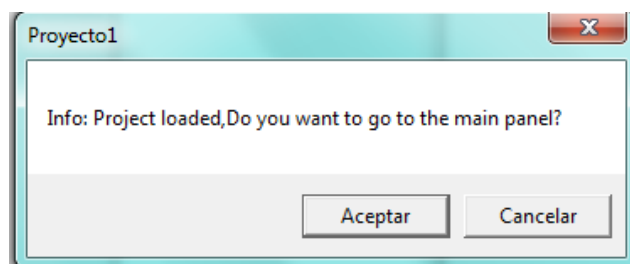


## Load Tab

A name and route to locate the 7 variables of the space to be loaded must be selected. In the same directory browser as each of the variables, you can browse and select the path for the relevant variable. At the end, select the format in which the space was saved (we recommend “binary”).



After this, click Load and wait for the following message:



Select Accept and the space will be loaded in the memory to perform the operations described above.

### 4.3 Batch processing

Actions can be performed by batches, specifying in a file the terms and characteristics of the operations to be performed.

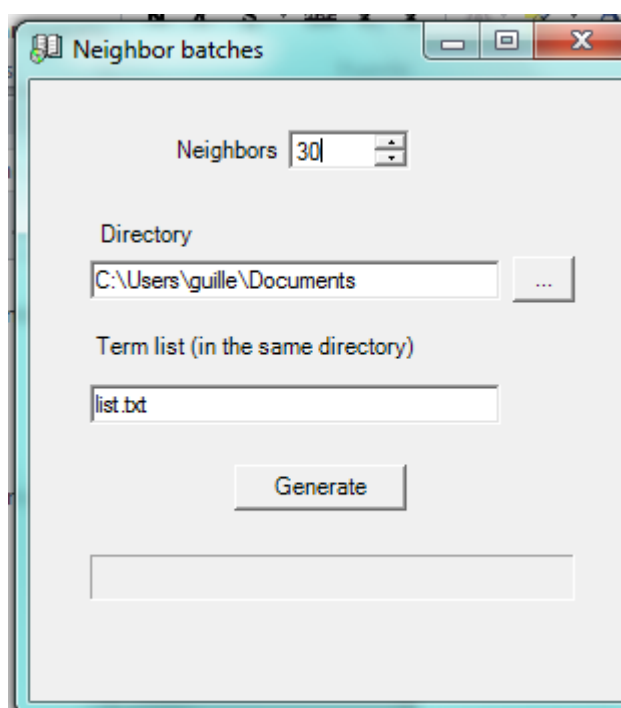
#### 4.3.1 Neighbor batches

The first  $n$  semantic neighbors will be extracted from a number of terms. In the expandable menu, the following screen will appear, where the number of neighbors, the directory where the file specifying the terms, and the file itself are specified.

**The file will have the following format**

match  
football  
note

The same process will generate a file per term, specifying the neighbor, cosine, and vector length



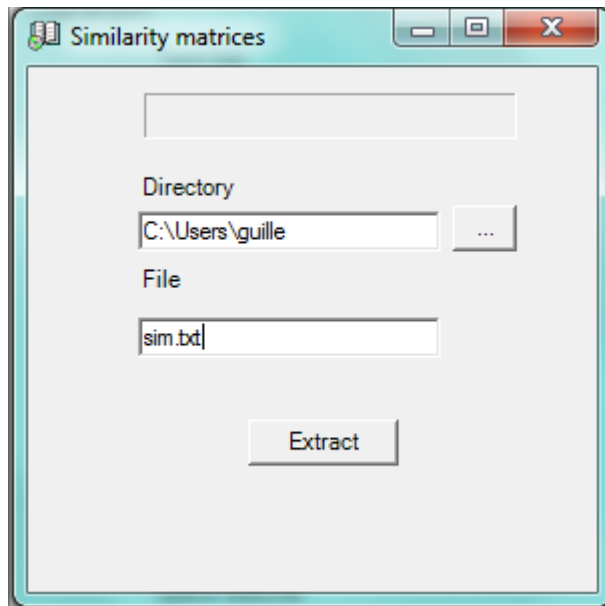
#### 4.3.2 Similarity matrices

A matrix will be extracted to compare the neighbors with each other. This square matrix has ones in its diagonal and each cell represents the cosine of two neighbors. The directory for the reference file and the file name itself will be specified. Similarity matrices will be generated in that same directory.

The file format is the following:

match|200  
football|300  
note|300

Where a 200x200 will be extracted in the first case, 300x300 in the second one, etc.

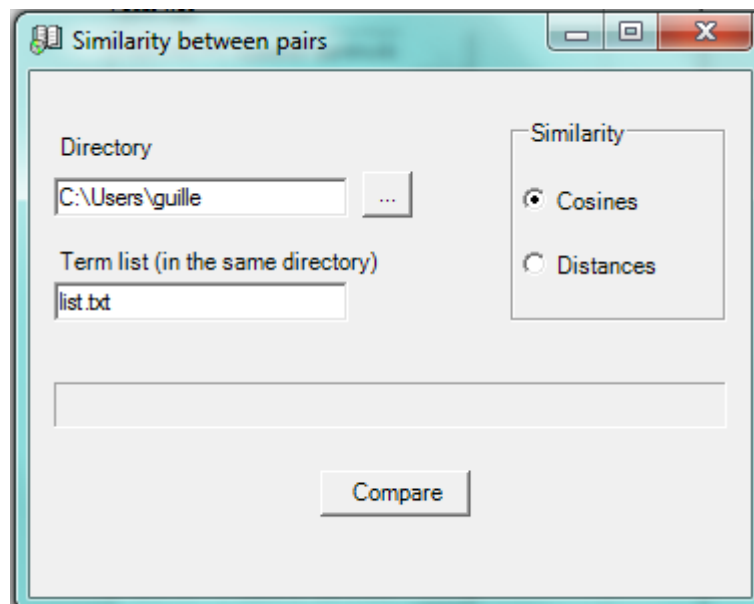


#### 4.3.3 Similarity between pairs

This will generate the similarities between a number of term pairs. The directory for the reference file and name of the file itself will be specified.

The file format will be the following:

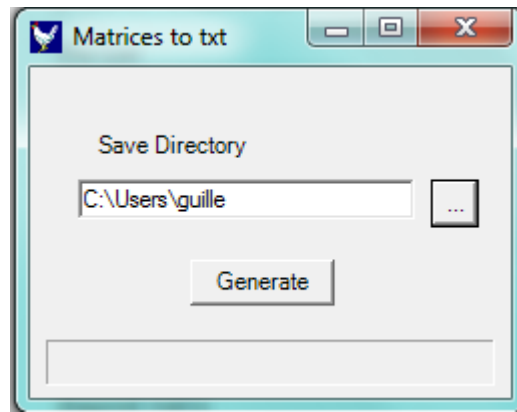
```
tremendous|action
dog|cat
share|stock
```



#### 4.4 Standard output

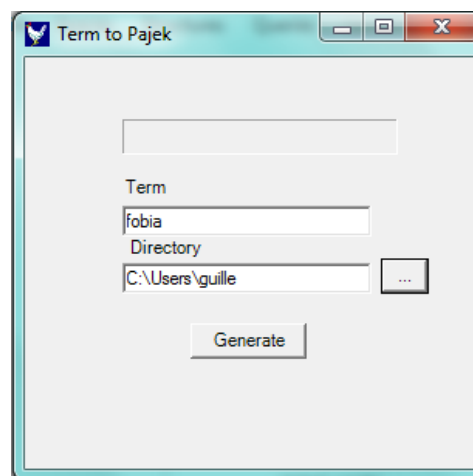
##### 4.4.1 Matrices to plain text files

The Export drop menu includes the option “Matrices to .txt”. Just enter the directory in which you wish to generate the files, which will be the US, SV, and S matrices, as well as the weights assigned by the calculations to each word (log-entropy or log-idf) and the vector length for each term.



#### 4.4.1 Term to Pajek file

For visualization purposes, there is a Term to Pajek option in the Export drop menu. From this process a file is extracted that will serve as input for the Pajek program to generate visualization networks.



Pajek is available at <http://vlado.fmf.uni-lj.si/pub/networks/pajek/> and can be downloaded for free. This output will use cosines as similarity and vector length as node size. By entering the input, graphs such as the one below can be obtained.

