

DRAFT Structural Modeling Project General Modeling Software Application DRAFT
Cluster Objects Into Classes [Auto]
11-15-2016

Introduction:

The clustering methods and process are the same for both the manual approach and automatic swap approach. This is true because the clustering methods do not create a relationship between classes. The clustering methods create groups of elements that form a class, so the relationship is between individual objects in a class not between classes.

This document provides a quick introduction and complete overview of a simple system structuring problem. The simple problem is taken from Appendix 2: GMU ISM Software A2.3.1 of the Handbook of Interactive Management. A digital copy of the Handbook is located at:

<http://demosophia.com/wp-content/uploads/2012/09/Handbook-of-Interactive-Management.pdf>

Clustering 13 objects into four clusters using the 'in the same category as' (ITSCA) natural language system structuring relationship. The ITSCA relationship has the following logical properties:

- reflexive
- symmetric
- transitive

Each cluster will contain one or more objects that are the same. This fact will be signified by a green background color in the matrix and vector cells. The green background matrix cells will contain a one (1), the green background vector cells will contain the object number.

The current web application requires that the user implement their own empirical search strategy. Unlike the computer-user interactive description in Appendix 2 of the 'Interactive Management Handbook', this application does not ask specific questions about specific pair of objects selected by the computer algorithm. Also, unlike the Appendix 2 presentation, this web application displays the system structural matrix state at each point in the system structuring process. This matrix visual display provides the foundation upon which the user can experiment with different types of solution algorithms.

The current web application mode is called the 'manual mode' and allows manual development of an algorithm. As the software development progresses, an automatic mode will be added to the application operational mode list. The application mode list will contain application algorithms that drive the object pair selection and other structuring decisions. The application will have the capability to use a number of algorithms, depending on the current operational context and the users objectives. In this manner the application will support the development of new algorithms as well as the distribution and use of current algorithms.

Step One:

Enter the number 13 into the size text box in the Cluster Objects Into Classes section of the SM GSM Application.

Step Two:

Press the "Display Cluster" button.

Structural Modeling Project

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Please Select The Appropriate Approach.

Strict Order - One Object Per Class [Manual]

Enter Initial Matrix Size

Size: [Display One](#) [Get Detailed Information](#)

Strict Order - One Object Per Class [Auto]

Enter Initial Matrix Size

Size: [Display One](#) [Get Detailed Information](#)

Strict Order - One Or More Objects Per Class [Manual]

Enter Initial Matrix Size

Size: [Display One Or More](#) [Get Detailed Information](#)

Strict Order - One Or More Objects Per Class [Auto]

Enter Initial Matrix Size

Size: [Display One Or More](#) [Get Detailed Information](#)

Cluster Objects Into Classes [Manual]

Enter Initial Matrix Size

Size: [Display Cluster](#) [Get Detailed Information](#)

Cluster Objects Into Classes [Auto]

Enter Initial Matrix Size

Size: [Display Cluster](#) [Get Detailed Information](#)

The screenshot shows the SM GSM Application window. At the top, there's a title bar and a menu bar. Below the menu bar, there's a file path and a search bar. The main area is titled "Structural Modeling Project". On the left, there's a legend box with four entries: "Known False" (red square), "Known True" (green square), "Unknown" (yellow square), and "Inferred True" (blue square). Below the legend, it says "Gaussian Augmented Naïve Bayes". To the right of the legend, there's a text box that says "Initial Matrix Size is 13". Below this, there are three input fields: "Enter Column Number: 2", "Enter Row Number: 4", and "Enter Data". Below these fields, there's a large matrix visualization. The matrix has 13 rows and 13 columns. The cells are colored based on the legend: red for "Known False", green for "Known True", yellow for "Unknown", and blue for "Inferred True". The matrix shows a pattern of known and unknown values. Below the matrix, there's a row of numbers from 1 to 13, and a column of numbers from 1 to 13. The matrix is currently displaying the values for row 4 and column 2.

Step Six:

Is 3 in the same category as 5? Yes

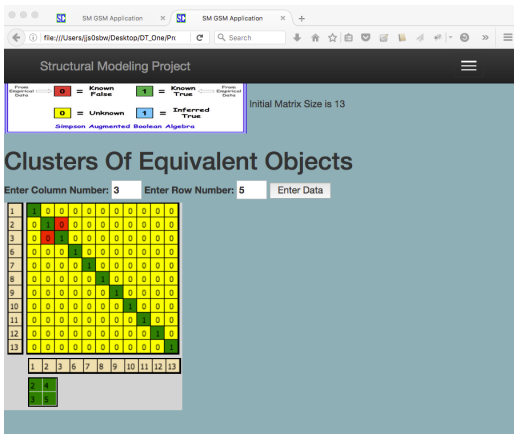
Step Seven:

Enter the number 3 in the “Enter Column Number” text input box.

Enter the number 5 in the “Enter Row Number” text input box.

Step Eight:

Press the “Enter Data” button.

**Step Nine:**

Is 1 in the same category as 6? Yes

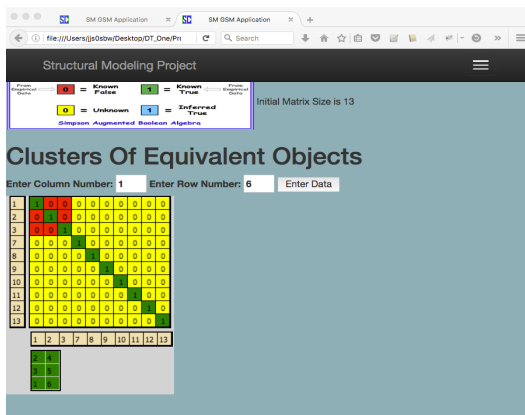
Step Ten:

Enter the number 1 in the “Enter Column Number” text input box.

Enter the number 6 in the “Enter Row Number” text input box.

Step Eleven:

Press the “Enter Data” button.

**Step Twelve:**

Is 1 in the same category as 7? Yes

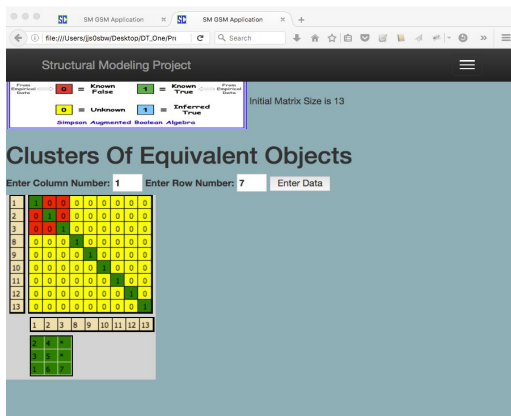
Step Thirteen:

Enter the number 1 in the “Enter Column Number” text input box.

Enter the number 7 in the “Enter Row Number” text input box.

Step Fourteen:

Press the “Enter Data” button.



Step Fifteen:

Is 2 in the same category as 8? Yes

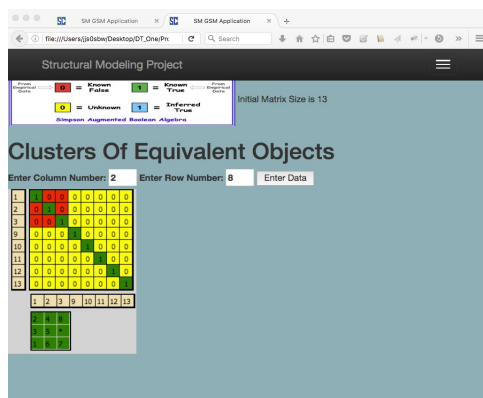
Step Sixteen:

Enter the number 2 in the “Enter Column Number” text input box.

Enter the number 8 in the “Enter Row Number” text input box.

Step Seventeen:

Press the “Enter Data” button.



Step Eighteen:

Continue to gather empirical information about the objects of interest.

Is 2 in the same category as 9? No (Do not enter anything in the application interface.)

Is 3 in the same category as 9? No (Do not enter anything in the application interface.)

Is 3 in the same category as 10? No (Do not enter anything in the application interface.)

Is 9 in the same category as 10? Yes

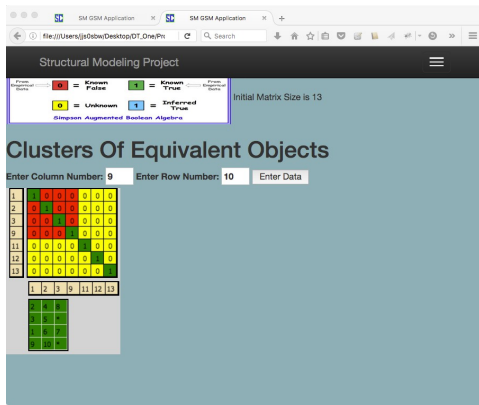
Step Nineteen:

Enter the number 9 in the “Enter Column Number” text input box.

Enter the number 10 in the “Enter Row Number” text input box.

Step Twenty:

Press the “Enter Data” button.



Step Twenty One:

Continue to gather empirical information about the objects of interest.

Is 9 in the same category as 11? No (Do not enter anything in the application interface.)

Is 2 in the same category as 11? No (Do not enter anything in the application interface.)

Is 2 in the same category as 12? No (Do not enter anything in the application interface.)

Is 3 in the same category as 11? Yes

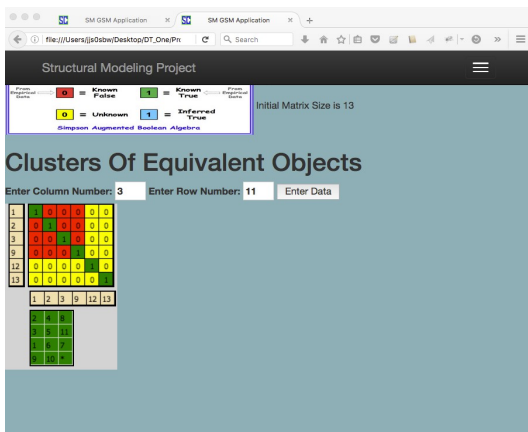
Step Twenty Two:

Enter the number 3 in the “Enter Column Number” text input box.

Enter the number 11 in the “Enter Row Number” text input box.

Step Twenty Three:

Press the “Enter Data” button.



Step Twenty Four:

Continue to gather empirical information about the objects of interest.

Is 3 in the same category as 12? No (Do not enter anything in the application interface.)

Is 1 in the same category as 12? No (Do not enter anything in the application interface.)

Is 1 in the same category as 13? Yes

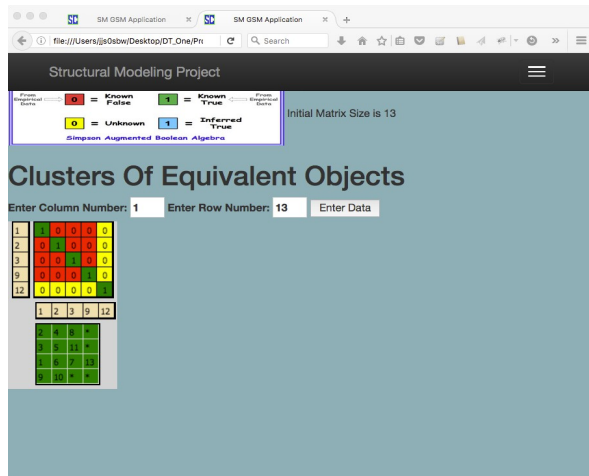
Step Twenty Five:

Enter the number 1 in the “Enter Column Number” text input box.

Enter the number 13 in the “Enter Row Number” text input box.

Step Twenty Six:

Press the “Enter Data” button.



Step Twenty Seven:

Is 9 in the same category as 12? Yes

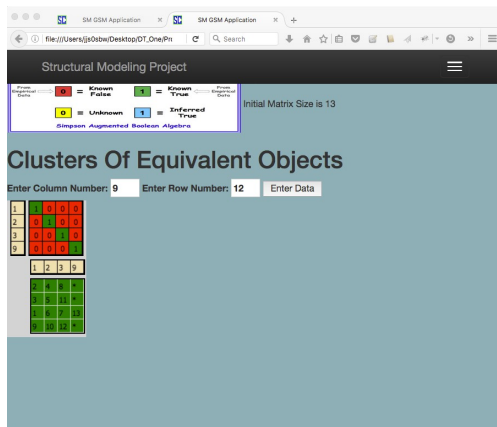
Step Twenty Eight:

Enter the number 9 in the “Enter Column Number” text input box.

Enter the number 12 in the “Enter Row Number” text input box.

Step Twenty Nine:

Press the “Enter Data” button.



NOTE: This is a draft document – subject to change.