

Tommi Kärkkäinen

Timo Aittokoski

Olli Hokkanen

A-KIT (AGORA EXPLORATORY ENVIRONMENT FOR
KNOWLEDGE DISCOVERY)

WORKING REPORT AND FUNCTIONAL DEVELOPMENT

InBCT 2.4
Agora Learning Laboratory
14.5.2003

Agora Center

Tiivistelmä: A-KIT-järjestelmä mahdollistaa kyselyistä kerätyn datan prosessoinnin ja analysoinnin kolmiulotteisen näkymän pohjalta, jolloin datajoukon kuvaavimmat piirteet, kuten erilliset pisteet tai ryhmittymät, havaitaan tavanomaisia menetelmiä tehokkaammin. Järjestelmä mahdollistaa myös kysymysten välisten korrelaatioiden sekä datajoukon yksittäisten pisteiden välisten suhteiden monipuolisen tarkastelun.

Abstract: The A-KIT visualization system is used to process questionnaire data with specific mathematical algorithms and to analyze the results in a three-dimensional view. This makes it possible to detect the most defining factors of the data set, e.g. separate data points or groups, more efficiently than with ordinary methods. The A-KIT system also supports comparisons between question correlations and relations between individual data points.

Contents

1	Introduction.....	1
2	Project summary	2
2.1	Development goals	2
3	Application instructions and help files.....	3
3.1	Instructions.....	3
3.1.1	A-KIT overview	3
3.1.2	Main window	3
3.1.3	Respondent data window	4
3.1.4	Correlation matrix window	6
3.1.5	Distance matrix window	7
3.1.6	Cluster matrix window.....	7
3.1.7	Help window	8
3.2	Help files.....	8
3.2.1	JavaHelp.....	9
3.2.2	Document authoring environment	9
4	Software requirements and user / software interactions	10
4.1	Software requirements	10
4.2	User / software interaction descriptions.....	10
4.2.1	Main window	10
4.2.2	Respondent data window	13
4.2.3	Correlation matrix window	16
4.2.4	Distance matrix window	17
4.2.5	Cluster matrix window.....	19
4.2.6	The help window	20
4.2.7	User interface dialogue diagram	21

1 Introduction

The goal of the functional development of the Agora Exploratory Environment for Knowledge Discovery (A-KIT) visualization application developed in Agora Center's Learning Laboratory (ALL) project is to improve usability and functionality of the application. This report concerns the visualization software, not the whole questionnaire creating process functionality. In this report 'A-KIT' means the A-KIT visualization application, unless stated otherwise.

The prototype version of the software, developed in 2002, was working as planned. The aim was to create e.g. technical documentation, help files and instructions for the software. Requirement specifications and user / software interaction descriptions were used to evaluate and improve the prototype usability and suitable software development methodologies were used to evaluate the application structure. After analyzing all aspects of the process some interfaces of the prototype were rebuilt, making the A-KIT system a powerful tool for analyzing questionnaire data. A-KIT system can be used later on to support research made in other InBCT-projects.

2 Project summary

The A-KIT visualization system is used to process questionnaire data with specific mathematical algorithms and to analyze the results in a three-dimensional view. This makes it possible to detect the most defining factors of the data set, e.g. separate data points or groups, more efficiently than with ordinary methods. The A-KIT system also supports comparisons between question correlations and relations between individual data points.

The purpose of the A-KIT application is not to replace traditional statistical applications (e.g. SPSS), but to support and add extra value to traditional qualitative analysis methods.

2.1 Development goals

The first ‘proof-of-concept’ initiation (prototype) of the whole A-KIT system is working as planned. To improve the A-KIT application and to make the development process ‘visible’ e.g. following things need to be developed.

A-KIT

- Technical documentation (object interfaces etc.)
- Usability documentation (testing, user / software interaction descriptions, help files)
- Methods documentation (algorithms etc.)

This report concerns mainly the usability documentation. Technical documentation and methodological documentation are published later on. The mathematical foundations for the data dimension compression are to be published in international publications.

3 Application instructions and help files

The application needs both instructions and 'on-line' help files and dialogues to achieve acceptable usability level. These instructions and help files are based on the user / software interaction descriptions. At some point the documents should be presented in XML format, where a specific DTD defines the logical structure of all documents (see chapter 3.2.2).

3.1 Instructions

These instructions explain the basic functionality and the purpose of the A-KIT application.

3.1.1 A-KIT overview

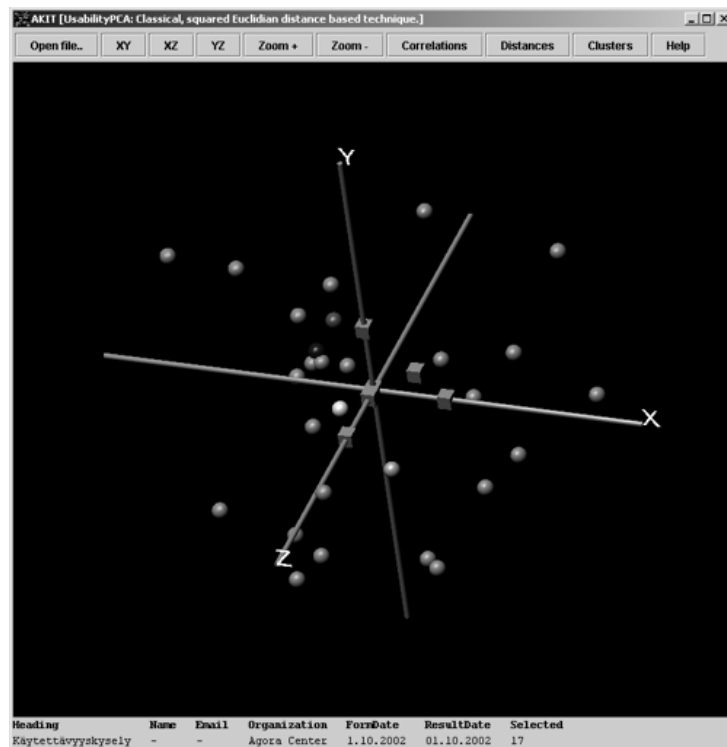
The A-KIT visualization system is used to process questionnaire data with specific mathematical algorithms and to analyze the results in a three-dimensional view. This makes it possible to detect the most defining factors of the data set, e.g. separate data points or groups, more efficiently than with ordinary methods. The A-KIT system also supports comparisons between question correlations and relations between individual data points.

Processed and compressed data is stored in files. The following methods are used in the dimension compression:

- PCA – Average based analysis (CiscoPCA.dat)
- MED - Median based analysis (CiscoMED.dat)
- SMD - Spatial median based analysis (CiscoSMD.dat)

3.1.2 Main window

After opening the file a three dimensional view window of the data set is opened (picture 1). The orbs represent individual respondents and the cubes represent specific values of the data set. The cubes on coordinate axes are the three primary components of the data set, the other cubes are spatial median, median and mean value.



Picture 1. A-KIT main window

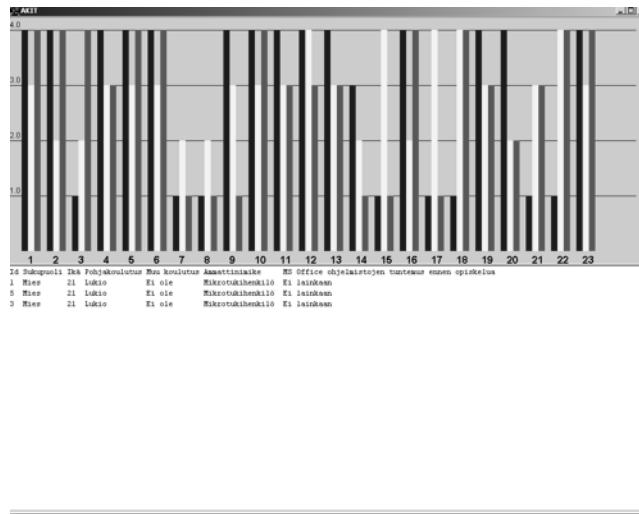
The purpose of the 3D-view is to find the most defining factors of the data set, e.g. separate data points or groups. In the original data set the number of dimensions is equal to the number of questions. After data transformation the number of dimensions is reduced to three, which represent the most significant features of the data set. These dimensions are illustrated by the coordinate axes.

The data set view can be rotated with mouse. Buttons 'XY', 'XZ' and 'YZ' can be used to rotate the data set to main coordinate levels. Zoom buttons enable zooming in and out of the view. Clicking on one of the orbs opens the respondent data window (see chapter 3.1.3). Multiple orbs can be selected at the same time.

To check a data point's ID number press the right mouse button on a data point. That data point's ID number is shown below the "selected" text.

3.1.3 Respondent data window

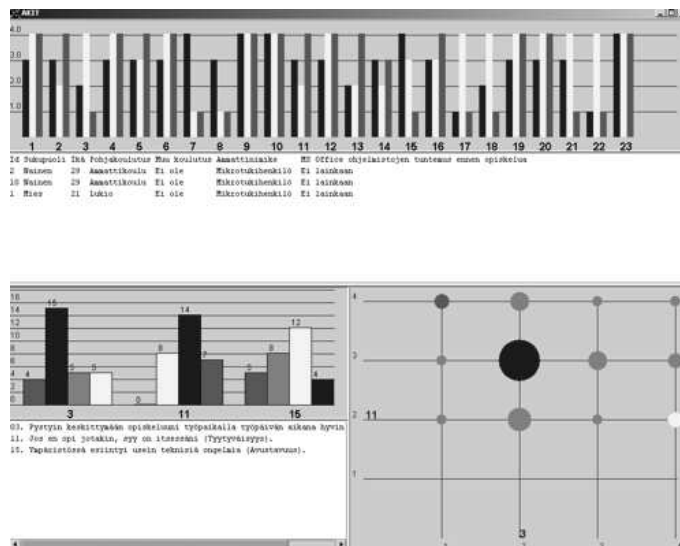
A specific respondent's answers can be examined by clicking one of the orbs representing the respondents in the main window. This opens a window where that respondent's answers are shown as a bar chart (picture 2).



Picture 2. Respondent data window

The numbers beneath the bars indicate the question numbers. In this example three different data points (i.e. respondents) have been selected from the main window. If multiple data points have been selected the colour of the bars indicate which data point is represented in the bar chart. Similar answers can be hidden from the bar chart by clicking the right mouse button on the chart. Clicking mouse button again shows the hidden answers.

The lower part of the window shows information about the selected respondent(s). A certain question's data can be examined by clicking that question's bar chart. This opens a histogram representing the question's response distribution in the lower part of the window (picture 3).



Picture 3. Respondent data window

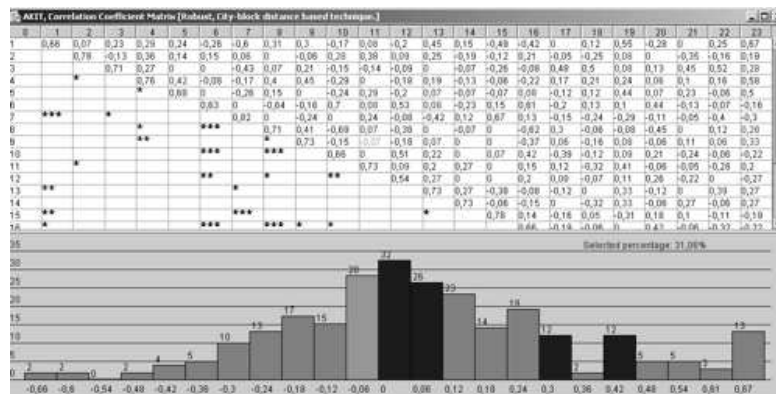
A histogram representing the question's response distribution is opened in the lower half of the window. Question text is under the bar chart. Colours of the bars in the histogram indicate how the respondents have answered to that question. Multiple data points (i.e. respondents) can be examined at the same time. If the respondent's have given similar answers the bar colour remains the first colour highlighted.

Selecting two questions from the question history diagram opens a scatter plot –view (in the lower right part of the window), which shows the correspondence of the selected questions. Now two questions are shown in the diagram, the first one clicked on the Y-axis and the latter on the X-axis. The dots indicate the answer distribution between those two questions. Clicking on another question moves the question positioned on the X-axis to the Y-axis and the new question is positioned on the X-axis. The scatter plot diagram only makes sense when two questions are being examined simultaneously.

To print the respondent bar chart keep the Ctrl-button pressed and press the left mouse button on the respondent data window's bar chart. This opens a standard Windows Print dialog.

3.1.4 Correlation matrix window

Clicking the 'Correlations' button opens the correlation matrix window associated with the data set (picture 4).



Picture 4. Correlation matrix window

In this matrix the number of rows and columns indicate the question numbers. The upper triangular matrix indicates the correlation of all questions numerically, meaning that the rows and columns in the matrix represent the question data correlation. The lower triangular matrix represents the significance level, which is indicated by a number of stars in the matrix cells.

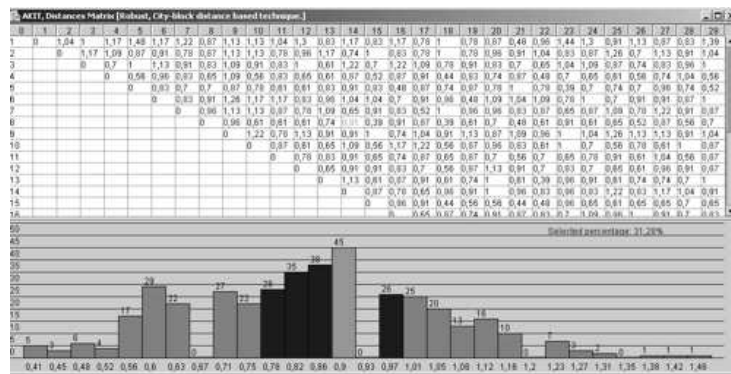
The histogram in the lower part of the window represents the distribution of correlation coefficients at different magnitude levels. The number of bars in the graph can be adjusted by right-clicking mouse button on the histogram and inputting the wanted number of bars.

Clicking on a coefficient factor's numeric value in the correlation matrix turns the corresponding bar, coefficient factor value and the significance level, if applicable, green, showing the correspondence of that correlation coefficient in the histogram.

Clicking on a correlation bar in the histogram turns all coefficient values distributed within that bar blue. Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

3.1.5 Distance matrix window

Clicking the 'Distances' button opens the distance matrix window associated with the data set (picture 5).



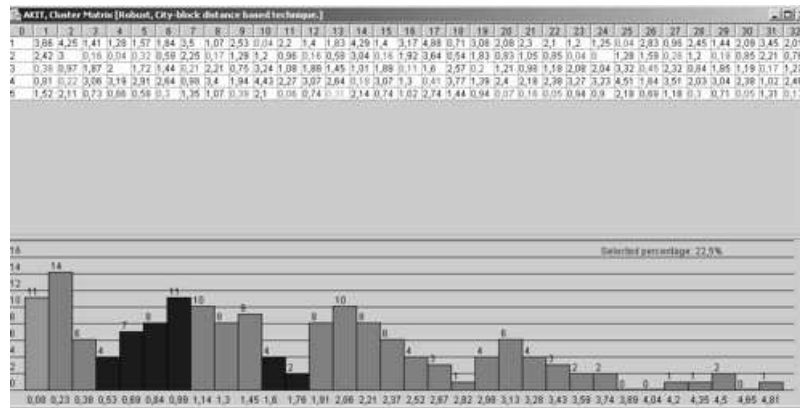
Picture 5. Distance matrix window

In this matrix the number of rows and columns indicate the respondent number and the cell values represent respondents' distance from each other. The histogram in the lower part of the window represents the distribution of distance values at different magnitude levels. The number of bars in the graph can be adjusted by right-clicking mouse button on the histogram and inputting the wanted number of bars.

Clicking on a distance value in the distance matrix turns the corresponding bar and distance value green, showing the correspondence of that distance value in the histogram. Clicking on a distance distribution bar in the histogram turns all distance values distributed within that bar blue. Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

3.1.6 Cluster matrix window

The purpose of clustering is to divide the data set in clearly distinguished subsets, clusters. In this application clustering is made using the well-known K-Means algorithm. Clicking the 'Clusters' button opens the cluster matrix window associated with the data set (picture 6).



Picture 6. Cluster matrix window

In the cluster matrix window the columns represent respondents, each row represents a different cluster and the values distributed within that cluster are coloured red. The numeric value in each cell indicates that cell's distance from corresponding cluster's centre point.

The histogram in the lower part of the window represents the distribution of cluster values at different magnitude levels. The number of bars in the graph can be adjusted by right-clicking mouse button on the histogram and inputting the wanted number of bars.

Clicking on a cluster value in the cluster matrix turns the corresponding bar and cluster value green, showing the correspondence of that cluster value in the histogram. Clicking on a cluster distribution bar in the histogram turns all cluster values distributed within that bar blue. Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

3.1.7 Help window

The help window uses JavaHelp technology, help texts are basically the same as in this chapter. Unfortunately the JavaHelp has problems with images, so the online help consists of text only.

3.2 Help files

At first it was decided to include online instruction texts in the application along with so called 'tool tip' help windows to explain the application functionality. However, most of the buttons in the A-KIT are self-explanatory (e.g. XY: Turn the coordinate axes to XY-position), meaning that the floating 'tool tip' hint windows would not be very useful. Just a normal online help along with a printable version of the document should be enough.

3.2.1 JavaHelp

One possibility for creating the help files is to use Sun Microsystems's JavaHelp for the Java platform. Since the whole application is created with Java technology, this seems to be a good solution. The JavaHelp uses HTML and XML files to define the structure and content of the help files. Usually the HTML files are transformed from some structured documentation format (e.g. DocBook), instead of writing the HTML-files.

When JavaHelp is integrated into the application basically just one "Help" button is added in the main window. The JavaHelp uses external help files written in HTML format, so modifying the help files does not require recompiling the application.

3.2.2 Document authoring environment

Validating editors are applications that interactively validate documents against a certain DTD (Document Type Definition) as they are edited. The logical structure of the document is defined with the DTD and the editor only allows correct elements to be written in a certain part of the document.

The idea is to keep the source document semantically rich and in one place. Help files, printable versions of the document etc. are transformed from the source document using specific stylesheets.

4 Software requirements and user / software interactions

After the detailed user / software interaction descriptions were written the application was tested according to these definitions and possible faults were repaired. Also some usability issues were considered and some extra functionality was added to the application.

4.1 Software requirements

To run the A-KIT application Java3D and JRE (Java Runtime Environment) have to be installed on the client machine. Consult your department's IT personnel on the matter.

4.2 User / software interaction descriptions

These descriptions are the tasks the program is required to be used for. In all descriptions the actor is the user of the A-KIT application.

Task definition

- Name
- Number
- Metadata (author, date, ...)
- Actor(s) (in A-KIT scenario there is only one actor)
- Preconditions
- Description
- Exceptions
- Postconditions

4.2.1 Main window

After opening the file a three-dimensional view window of the data set is opened. The orbs represent individual respondents and the cubes represent specific values of the data set. The cubes on the coordinate axes are the three primary components of the data set, the other cubes are spatial median, median and mean value.

The data set view can be rotated with mouse. Buttons 'XY', 'XZ' and 'YZ' can be used to rotate the data set to main coordinate levels. Zoom buttons enable zooming in and out of the view. Other buttons include: Open File, Correlations, Distances, and Exit.

4.2.1.1 Starting up A-KIT

Preconditions: -

Description:

User starts the program by double clicking the AKIT shortcut icon. The A-KIT main window is opened. Only buttons Open File, Help and Exit are working at this point.

Exceptions: [1. java errors] Problems with loading classes etc. Program is not started.

Postconditions: A-KIT is running.

4.2.1.2 Opening a data file

Preconditions: A-KIT is running.

Description: User presses the “Open File”-button on the main window. A standard Windows Open dialog is opened. User selects wanted data file and presses “Open” button from the dialog [1. Cancel is pressed]. Windows Open file dialog closes [2. existing data file is already opened] and control returns to A-KIT main window.

A three-dimensional view window of the data set is opened. General information about the opened questionnaire data file is shown in the lower part of the window. All the buttons in the main window are working.

Exceptions:

[1. Cancel is pressed] Raised if the user presses the “Cancel” button from the Windows Open dialog. Dialog closes and control returns to A-KIT main window. New data file is not opened.

[2. Existing data file is already opened] Raised if existing data file is already opened. Old data file and all it's windows are closed. Dialog closes and control returns to A-KIT main window. New data file is opened in the main window.

[3. File corrupted] Raised if the data file (file.dat) is corrupted or user tries to open some other file. No data file is opened.

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.1.3 Zooming and rotating the data set view

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User presses the zoom-buttons or rotates the view and the view is zoomed or rotated.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.1.4 Checking a data point's ID number

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User presses the right mouse button on a data point. The data point's ID number is shown in the main window under the "selected" text.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.1.5 Opening the respondent data window

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User clicks a data point in the main window. The respondent data window is opened.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

4.2.1.6 Opening the correlation matrix window

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User presses the "Correlations"-button on the main window. The correlation matrix window is opened.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

4.2.1.7 Opening the distance matrix window

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User presses the "Distances"-button on the main window. The distance matrix window is opened.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

4.2.1.8 Opening the cluster matrix window

Preconditions: A-KIT is running. A data file is opened in the main window.

Description: User presses the “Clusters”-button on the main window. The cluster matrix window is opened.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

4.2.1.9 Opening the help window

Preconditions: A-KIT is running.

Description: User presses the “Help”-button on the main window. The help window is opened.

Exceptions:

Postconditions: A-KIT is running. The help window is opened.

4.2.1.10 Closing the A-KIT application

Preconditions: A-KIT is running.

Description: User presses the “Close”-button on the main window. The A-KIT application is closed.

Exceptions:

Postconditions: -

4.2.2 Respondent data window

A specific respondent’s answers can be examined by clicking one of the orbs representing respondents in the main window. This opens a window where that respondent’s answers are shown as a bar chart. Numbers beneath the bars indicate question numbers.

The lower part of the window shows information about the selected respondent. A certain question’s data can be examined by clicking that question’s bar chart. This opens a histogram representing question’s response distribution. The bar representing the answer of the respondent in question is turned blue.

Multiple data points (i.e. respondents) can be examined at the same time; the colour of the bar indicates which data point is represented in the chart. Selecting two questions from the

question history diagram opens a scatter plot –view, which shows the correspondence of the selected questions.

4.2.2.1 Removing similar answers from the respondent data window

Preconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened. At least two different data points are being examined.

Description: User presses the right mouse button on the respondent data window's bar chart. Similar answers are removed from the bar chart. Pressing the right mouse button again shows the removed answers.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

4.2.2.2 Inspecting question data

Preconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

Description: User presses a question's bar chart on the respondent data window. The respondent data window is split in half horizontally and existing data (respondent's answers and respondent data) is shown in the upper half of the window. A histogram representing the question's response distribution is opened in the lower half of the window. Question text is under the bar chart. The bar representing the answer of the respondent in question is turned blue.

Multiple data points (i.e. respondents) can be examined at the same time; the colour of the bar indicates which data point is represented in the chart. Colours of the bars in the histogram also change to indicate which respondent's answers are being examined [1. Same answers].

Exceptions:

[1. Same answers] If the respondent's have given similar answers the bar colour remains the first colour highlighted.

Postconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened. A histogram representing a question's response distribution is opened.

4.2.2.3 Using the question scatter plot diagram

Preconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened. A histogram representing a question's response

distribution is opened. At least two different questions should be opened to make the scatter plot view sensible.

Description: User presses a response bar in the response distribution histogram. The lower part of the window is divided vertically in two parts. The response distribution histogram and question texts are shown in the lower left side. The scatter plot diagram is opened in the lower right part of the window. User presses another question's response bar.

Now two questions are shown in the diagram, the first one clicked on the Y-axis and the latter on the X-axis. The dots indicate the answer distribution between those two questions. Clicking on another question moves the question positioned on the X-axis to the Y-axis and the new question is positioned on the X-axis. The scatter plot diagram only makes sense when two questions are being examined simultaneously.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened. A histogram representing a question's response distribution is opened. The scatter plot diagram is opened.

4.2.2.4 *Printing the respondent data bar chart*

Preconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

Description: User presses the Ctrl-button and the left mouse button on the respondent data window's bar chart. A standard Windows Print dialog is opened. User selects wanted printer and presses "Print" button from the dialog [1. Cancel is pressed]. Windows print file dialog closes and control returns to respondent data window. The respondent data bar chart is printed.

Exceptions: [1. Cancel is pressed] The Windows Print dialog is closed and control returns to respondent data window. The bar chart is not printed.

Postconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

4.2.2.5 *Closing the respondent data window*

Preconditions: A-KIT is running. A data file is opened in the main window. The respondent data window is opened.

Description: User presses the close-button on the respondent data window. The respondent data window is closes.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.3 Correlation matrix window

In the correlation matrix the number of rows and columns indicate the question number. The upper triangular matrix indicates the correlation of all questions numerically, meaning that the rows and columns in the matrix represent question data correlation. The lower triangular matrix represents the significance level, which is indicated by a number of stars in the matrix cells.

The histogram in the lower part of the window represents the distribution of correlation coefficients at different magnitude levels. The number of bars in the graph can be adjusted by right-clicking mouse button on the histogram and inputting the wanted number of bars.

Clicking on a coefficient factor's numeric value in the correlation matrix turns the corresponding bar, coefficient factor value and the significance level, if applicable, green, showing the correspondence of that correlation coefficient in the histogram. Clicking on a correlation bar in the histogram turns all coefficient values distributed within that bar blue. Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

4.2.3.1 *Inspecting the correspondence of a correlation coefficient in the histogram.*

Preconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

Description: User clicks left mouse button on a coefficient factor's numeric value in the correlation matrix. The coefficient factor value, the corresponding bar in the histogram and the corresponding significance level, if applicable, are turned green.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

4.2.3.2 *Inspecting the distribution of correlation coefficients in the matrix.*

Preconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

Description: User clicks on a correlation bar in the histogram. All coefficient values distributed within that bar blue are turned blue. The "selected percentage" value is changed according to the amount of selected values.

Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

4.2.3.3 *Changing the number of bars in the histogram*

Preconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

Description: User clicks right mouse button on the histogram. A “select pin count” dialog is opened. User enters the wanted number of bars and clicks on the “Ok” button [1. Cancel is pressed].

Exceptions:

[1. Cancel is pressed] Raised if the user presses the “Cancel” button from “Selected pin count” input dialog. Dialog closes and control returns to A-KIT main window. The number of bars is not changed.

Postconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

4.2.3.4 *Closing the correlation matrix window*

Preconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

Description: User presses the close-button on the correlation matrix window. The correlation matrix window is closed.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The correlation matrix window is opened.

4.2.4 Distance matrix window

Clicking the ‘Distances’ button opens the distance matrix associated with the data set. In this matrix the number of rows and columns indicate the respondent number and the cell values represent respondents’ distance from each other.

The histogram in the lower part of the window represents the distribution of distance values at different magnitude levels. The number of bars in the graph can be adjusted by right-clicking mouse button on the histogram and inputting the wanted number of bars.

Clicking on a distance value in the distance matrix turns the corresponding bar and distance value green, showing the correspondence of that distance value in the histogram. Clicking on a distance distribution bar in the histogram turns all distance values distributed

within that bar blue. Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

4.2.4.1 Inspecting the correspondence of a distance value in the histogram.

Preconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

Description: User clicks left mouse button on a distance numeric value in the distance matrix. The distance value and the corresponding bar in the histogram are turned green.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

4.2.4.2 Inspecting the distribution of distance values in the matrix.

Preconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

Description: User clicks on a correlation bar in the histogram. All distance values distributed within that bar blue are turned blue. The “selected percentage” value is changed according to the amount of selected values.

Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

4.2.4.3 Changing the number of bars in the histogram

Preconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

Description: User clicks right mouse button on the histogram. A “select pin count” dialog is opened. User enters the wanted number of bars and clicks on the “Ok” button [1. Cancel is pressed].

Exceptions:

[1. Cancel is pressed] Raised if the user presses the “Cancel” button from “Selected pin count” input dialog. Dialog closes and control returns to A-KIT main window. The number of bars is not changed.

Postconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

4.2.4.4 *Closing the distance matrix window*

Preconditions: A-KIT is running. A data file is opened in the main window. The distance matrix window is opened.

Description: User presses the close-button on the distance matrix window. The distance matrix window is closed.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.5 Cluster matrix window

The purpose of clustering is to divide the data set in clearly distinguished subsets, clusters. In this application clustering is made using the K-Means algorithm.

In the cluster matrix window the columns represent respondents, each row represents a different cluster and the values distributed within that cluster are coloured red. The numeric value in each cell indicates that cell's distance from the corresponding cluster's centre point. Histogram functionality is similar to that of the correlation matrix window.

4.2.5.1 *Inspecting the correspondence of a cluster value in the histogram.*

Preconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

Description: User clicks left mouse button on a cluster numeric value in the cluster matrix. The cluster value and the corresponding bar in the histogram are turned green.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

4.2.5.2 *Inspecting the distribution of cluster values in the matrix.*

Preconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

Description: User clicks on a correlation bar in the histogram. All coefficient values distributed within that bar blue are turned blue. The "selected percentage" value is changed according to the amount of selected values.

Multiple bars can be selected simultaneously. Clicking mouse button on a selected factor reverses selection.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

4.2.5.3 *Changing the number of bars in the histogram*

Preconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

Description: User clicks right mouse button on the histogram. A “select pin count” dialog is opened. User enters the wanted number of bars and clicks on the “Ok” button [1. Cancel is pressed].

Exceptions:

[1. Cancel is pressed] Raised if the user presses the “Cancel” button from “Selected pin count” input dialog. Dialog closes and control returns to A-KIT main window. The number of bars is not changed.

Postconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

4.2.5.4 *Closing the cluster matrix window*

Preconditions: A-KIT is running. A data file is opened in the main window. The cluster matrix window is opened.

Description: User presses the close-button on the distance matrix window. The cluster matrix window is closed.

Exceptions:

Postconditions: A-KIT is running. A data file is opened in the main window.

4.2.6 The help window

The help window consists of Sun Microsystems’s JavaHelp for the Java platform. The JavaHelp uses HTML and XML files to define the structure and content of the help files.

4.2.6.1 *Closing the help window*

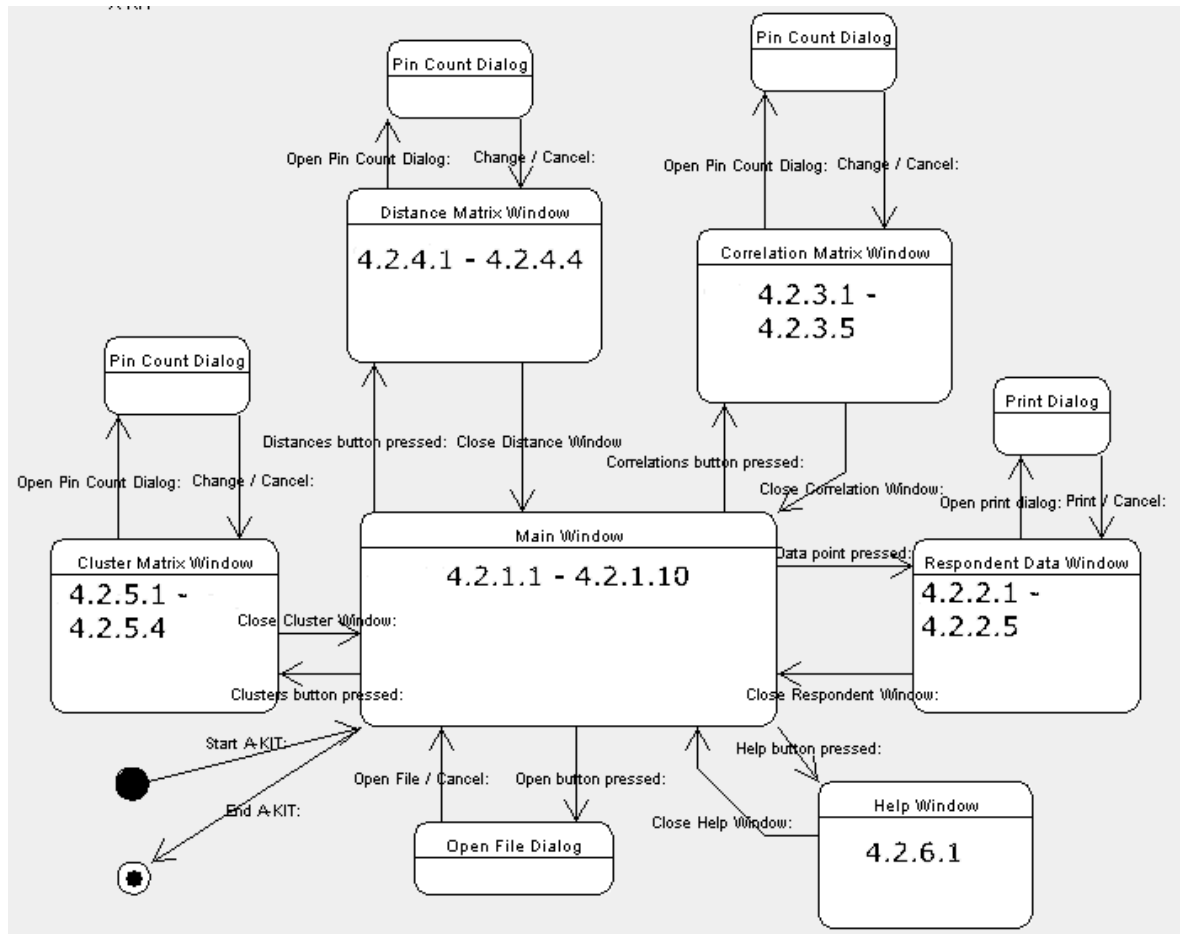
Preconditions: A-KIT is running. The help window is opened.

Description: User presses the close-button on the help window. The help window is closed.

Exceptions:

Postconditions: A-KIT is running.

4.2.7 User interface dialogue diagram



Picture 8. User interfaces