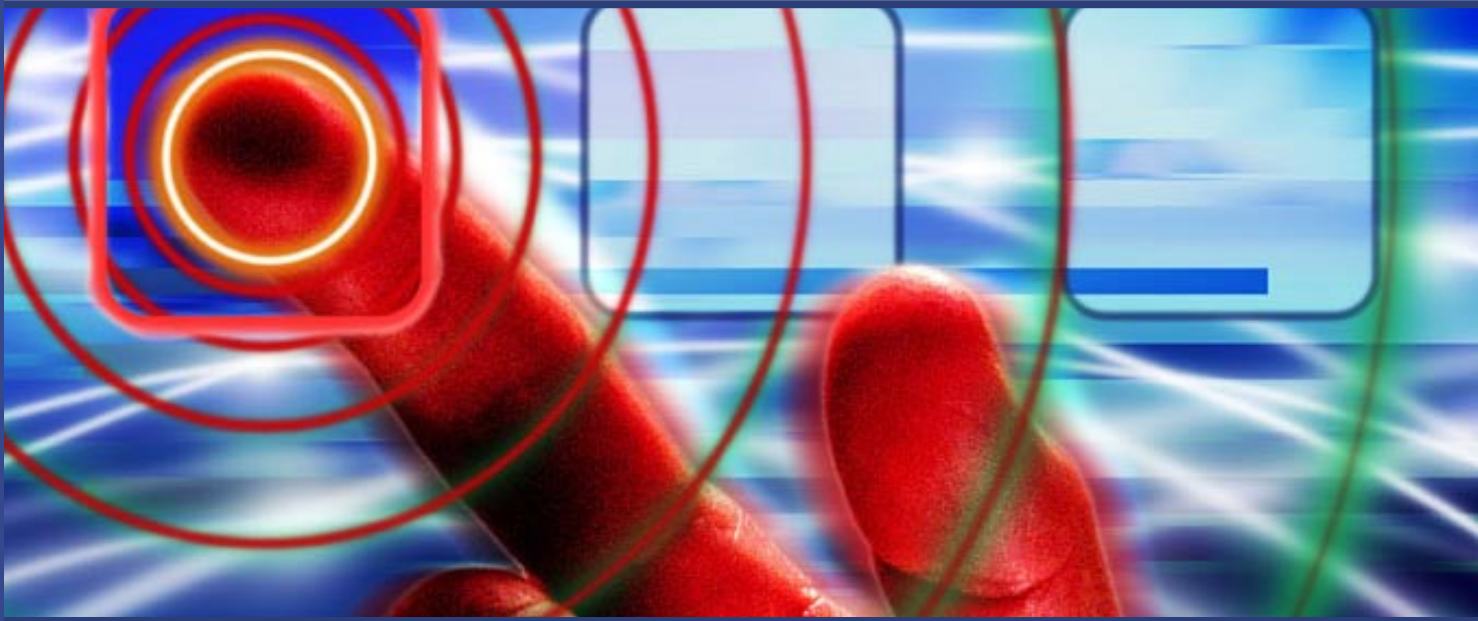


# Clementine data mining workbench

from SPSS

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 **Bloor**  
Research





## Fast facts

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Clementine is an integrated data mining workbench. That is, it provides a wide array of data mining techniques, along with pre-built vertical solutions, in an integrated and comprehensive manner, with a special focus on visualisation and ease-of-use.

The latest release (Clementine 9.0) incorporates many enhancements, which fall into a number of areas. Productivity is, perhaps, the most important of these. One of the key concerns within the business community about analytic activity is the time that is taken. In Clementine 9.0, there are many improvements that are targeted specifically at enhancing the productivity of the analyst. In addition, data mining is no longer a back-room activity—its results are now widely deployed throughout the enterprise and are leveraged by many users—this new release includes a number of significant features designed to assist in this enterprise-wide deployment.

### **Key findings**

In the opinion of Bloor Research the following represent the key facts of which prospective users should be aware:

- Clementine supports the CRISP-DM methodology for data mining.
- Clementine is not restricted to one, or even a few, data mining algorithms and offers a wide range of decision tree, neural network and other algorithms, which may be used either individually or in combination.
- We found the act of using Clementine highly intuitive, using visual programming techniques to define processes and try out ideas. In addition, the CLEM Expression Builder is relatively simple to use even for novices, while the statistical and graphical displays are easy to understand and interpret.
- Users don't have to know how different algorithms work, just what they do. However, beginners may find it easy to forget which algorithm does what. You can refer to the help system if necessary, but there is also a 'ready reference' for each operation, which appears in the form of pop-up text when you hover your mouse pointer over the icon representing that operation.
- Following the acquisition of DataDistilleries by SPSS, the process of deploying models into mainstream applications that can benefit from the addition of analytical power has been considerably enhanced.
- Front-end connectivity for the users of databases that offer kernel support for data mining processes (SQL Server, DB2 and Oracle) is supported by the fact that you can now generate native SQL for the appropriate database, directly from Clementine, in a fashion that is transparent to the user.



## **The bottom line**

Traditionally, data mining has usually been regarded as a relatively complex discipline. However, SPSS would argue with this view. In its opinion any complexity or difficulty has primarily been put about by those trying to sell consulting. While it would admit that there is a skill involved in translating between business problems and the data mining environment, the company does not believe that it is necessary for users to understand what is going on in the engine.

While you could argue the point about the complexity of data mining the fact is that SPSS has done its level best to remove any complexity that does exist or, at least, to hide it from view. In the opinion of Bloor Research it is this focus on ease-of-use (at the business user level) that is the most impressive feature of Clementine. Yes, the product has some nice features (not least the ability to incorporate text mining) but it is the product's usability that has enabled the product to reach a leadership position in the market: in our view it is also what will keep it there.



# Vendor information

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## Background information

Clementine was originally developed by Integral Solutions Ltd (ISL), which was formed in 1989 by Dr Alan Montgomery and five colleagues from a management buyout of the AI Products Division of SD-Scicon, an IT consultancy that subsequently became a part of EDS.

From the outset, the aim of ISL was to build an integrated environment for data mining operations that could be used and understood by business people, without the need to rely on technical experts. Clementine itself began as a research product in 1992, which was part-funded by the UK's Department of Trade and Industry, and the product was first brought to market in 1994.

Clementine was one of the very first products to bring machine learning to business intelligence, while providing a user interface that was intelligible to non-experts. As a result it rapidly gained a leadership position within the market, which it has retained to this day.

However, the success of Clementine was always inherently limited by the fact that ISL was a relatively small organisation (no more than about 40 staff), which was always likely to struggle against the giants of the IT industry. The takeover of ISL by SPSS in 1998 therefore opened up new opportunities for Clementine that might otherwise not have been available.

SPSS itself was founded in 1968 and earned its reputation primarily as a provider of statistical software, plus graphical applications to represent those statistics. In fact, prior to its acquisition of ISL, SPSS had two data mining products of its own: AnswerTree and Neural Connection. As might be deduced from their names, the former offered support for decision tree algorithms while the latter supported neural networking. AnswerTree is still sold by SPSS as an algorithmic tool rather than as a generalised workbench but Neural Connection is now defunct.

In recent years the company has expanded significantly through a process of acquisition. Most recently, SPSS acquired DataDistilleries, a move that, at first sight, might have led one to suspect a significant overlap with Clementine, but which has actually resulted in a very synergistic leap forward in capability. DataDistilleries did indeed possess substantial data mining capability, but its greatest strength lay in the deployment of that capability into various analytical business applications. Following the acquisition, SPSS has been able to incorporate these capabilities into the products that are known as SPSS PredictiveMarketing, SPSS PredictiveCallCenter, SPSS PredictiveWeb and SPSS PredictiveClaims (see later). In other words, the company has been able to move rapidly from being a provider of tools into a leader in the provision of analytical applications.

In parallel to this move into the provision of analytic solutions, SPSS has also been concentrating on its own infrastructure so that it can now offer a complete Enterprise Platform for Predictive Analytics (see Figure 1) that integrates all of

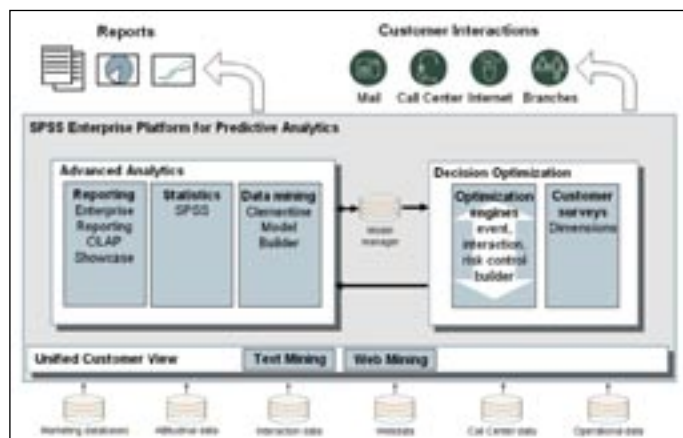


Figure 1: The complete Enterprise Platform for Predictive Analytics

its data/text/web mining, predictive analytics, statistics, survey and reporting capabilities into a single platform.

In total, what this has meant for Clementine is that it is now the basis for many powerful analytical applications that can be more readily embedded and used within frontline business operations in areas such as call centres, as well as in generic applications. Overall, it is now apparent that SPSS has a far more comprehensive and coherent strategic view of its role in the intelligent and predictive enterprise, and most significantly of all, it now possesses the means to deliver that vision.

SPSS web address: [www.spss.com](http://www.spss.com)

## Product availability

As has been noted, Clementine was first introduced to the market in 1994. The latest version of the product is 9.0, which was released at the end of 2004. Clients are Microsoft Windows-based, while the server may run under Windows, AIX, Sun Solaris (including 64-bit support on Solaris 9 & 10), HP-UX or OS/400.

There are a number of optional products associated with Clementine, most notably Text Mining for Clementine, which leverages the facilities of the company's LexiQuest text mining technology; Web Mining for Clementine, which does the same thing with respect to the NetGenesis product, providing analysis of web-based behavioural data; Cleo, which provides a web deployment environment for interactive predictive models; and, new in this release, there is optional integration with SPSS Model Manager. A 30-day free trial of Model Manager, which provides repository capabilities, is included with Clementine 9.0.

In addition to these, the SPSS analytic applications derived from the Data-Distilleries stable, PredictiveMarketing, PredictiveCallCenter, PredictiveWeb and PredictiveClaims (which is used to determine the validity of insurance claims) can all leverage the facilities provided by Clementine.

## Financial results

SPSS is a publicly quoted company on the NASDAQ exchange. In the fiscal year 2004 the company had revenues of \$224.1m compared to \$208.4m in the previous year, and the company is moving positively ahead with strong results. The most recent quarter (Q4, 2004) confirms this positive picture with revenues increasing to \$60.5m, compared with \$57m the previous year, and \$54m the year before that. Revenues for the fiscal year 2004 are the highest in the company's history. As of December 31st 2004 the company had cash of \$37.1m and a cash flow from operations of \$12.2m. SPSS has offices in more than 40 countries across all continents and in addition to a direct sales force it has a worldwide network of franchises and distributors.



# Product description

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## Introduction

Over the last few years the market for data mining tools has changed dramatically. In particular, we have seen the emergence of analytic applications as a distinct discipline. Previously, the sort of things that analytics now provides belonged within the domain of data mining. For example, market basket analysis used to be regarded as a pure data mining technique. Today it is packaged and delivered within a variety of analytic software products.

In effect, what has happened is that the heuristic approach provided by data mining tools has led to the identification of algorithms that can be applied to a range of environments such as market basket analysis. Algorithms are also much easier to package for deployment by the casual user.

However, analytic applications (as supplied by non-data mining vendors) are limited by the fact that they are intrinsically about analysing what has already happened: you are left to make your own extrapolations as to how that might be reflected in the future. Data mining however, has this predictive ability as well, in addition to the sort of base analytic capabilities that are offered by CRM and other vendors. In fact, SPSS is delivering what we might call genuine analytic applications (in that they provide predictive capabilities), for a number of different environments. These are discussed further later.

Nevertheless, it is clear that 'analytics' has become a popular buzzword and, in order to capitalise on this, SPSS and other vendors have now started to refer to their products' capabilities as providing 'predictive analytics'.

Most recently, another significant change in the market is that the use of analytics is no longer seen as a minority capability. Leaders in this segment (which includes SPSS) are providing capabilities based on both historic analysis and future prediction to every seat within a business environment that can utilise the benefits of that analysis. So, while a few years ago the sale of a data mining tool would have been to, say, 5 seats, now the analytical application, (which is the data mining tool together with all of its associated deployment elements) is being made available to hundreds if not thousands of seats. As the demand within business is for faster and better decision making closer to the point of contact, be that a production line or a customer, analytical applications are one of the main tools that can be used to empower workers to fulfil that management goal.

Finally, the other thing to note about data mining (or predictive analytics) is that there are very few major players (of which SPSS is one) left in the market. A few years ago there were a plethora of such vendors but most of these have either fallen by the wayside, been taken over, or have diverted into niche markets. That Clementine is one of the market leading products in this area is a testament, not just to its technology, but also to its user-friendly nature.



## Architecture

Historically, Clementine was a client-only product in which all processing took place on the client itself. While external databases could be accessed, they were treated by the software as local files; this approach necessarily put a heavy burden on the client platform.

Clementine was originally implemented on X-Windows platforms rather than Microsoft Windows. However, with the release of version 5.1 of Clementine in 1999, SPSS introduced a server-based version of the product, with middleware running on a middle-tier server taking the load off the client and using the superior performance of back-end databases to support in situ data mining. Features introduced at that time included SQL optimisation, storage of intermediate results and, of course, much reduced network traffic. More recently, the company has also implemented in-database sampling and automatic operation re-ordering for in situ mining, both of which improve performance and scalability.

Nevertheless, despite the move to a three-tier architecture, SPSS persisted with X-Windows until release 7.0, in which it adopted a Microsoft Windows front-end. According to SPSS this meant the largest engineering feat that the company had ever had to face, to build in all the sorts of features that users expect at this level. In fact, the product included a raft of usability enhancements in that release, such as full cut and paste support, the ability to have multiple streams (process models) open at the same time, a Java front-end, automated node connection (with a process model), a preview pane, and an improved script editor that includes syntax checking capabilities amongst others.

With the latest releases of Clementine (8 and 9) the integration of the product at both the back-end (into the enterprise infrastructure) and the front-end (into business applications) has been transformed. Clementine is now an integrated part of the corporate IT arsenal and should not be viewed as a stand-alone element.

One of the biggest changes has been the move to put the code for data mining functions into the kernel of the database, a move started by Oracle and since followed by IBM with DB2 and, increasingly, Microsoft with SQL Server. Whilst a great idea to enable data mining to be invoked within the kernel, using SQL, the issue that faced early users with Oracle after its initial release was how to actually access the kernel without having to write the relevant SQL. As has been mentioned already, the drive in data mining has been to take that process away from the isolated analytics expert and to empower business users to employ it for themselves. Writing SQL was obviously a retrogressive step in that process. Clementine can now be used as the visual workbench to generate the necessary SQL (integrating directly with Oracle Data Mining, IBM DB2 Intelligent Miner and Microsoft OLAP Services, and enabling you to build and score models directly within these databases) without the user having to have any knowledge of how and what is happening at a technical level.



## Methodology

SPSS (and ISL before it) has always espoused the use of a formal methodology for data mining and it has been a member of the CRISP-DM (Cross Industry Standard Process for Data Mining) group since its foundation in 1996. This methodology defines a six stage process for data mining projects, whose steps are detailed below. In addition, Clementine includes a project tool, and an associated help system, that specifically supports the CRISP-DM method. The six steps in that method are illustrated in the following table, where generic tasks are shown in bold and outputs are in plain type:

Business Understanding	Data Understanding	Data Preparation	Modelling	Evaluation	Deployment
<b>Determine Business Objectives</b> Background Business objectives Business success criteria  <b>Assess Situation</b> Inventory of resources Requirements, assumptions & constraints Risks & contingencies Terminology Costs & benefits  <b>Determine Data Mining Goals</b> Data Mining goals Data Mining success criteria  <b>Produce Project Plan</b> Project Plan Initial assignment of tools & techniques	<b>Collect Initial Data</b> Initial data collection report  <b>Describe Data</b> Data description report  <b>Explore Data</b> Data exploration report  <b>Verify Data Quality</b> Data quality report	<b>Data set</b> Data set description  <b>Select Data</b> Rationale for inclusion/exclusion  <b>Clean Data</b> Data cleansing report  <b>Construct Data</b> Derived attributes Generated records  <b>Integrate Data</b> Merged data  <b>Format data</b> Reformatted data	<b>Select Modelling Techniques</b> Modelling technique Modelling assumptions  <b>Generate Text Design</b> Text design  <b>Build Model</b> Parameter settings Models Model description  <b>Assess Model</b> Model assessment Revised parameter settings	<b>Evaluate Results</b> Assessment of Data Mining results w.r.t. Business Success Criteria Approved models  <b>Review Process</b> Review of process  <b>Determine Next Steps</b> List of possible actions Decision	<b>Plan Deployment</b> Deployment plan  <b>Plan Monitoring and Maintenance</b> Monitoring & maintenance plan  <b>Produce Final Report</b> Final report Final presentation  <b>Review Project</b> Experience documentation

Hopefully this table should be reasonably self-explanatory and we will consider the facilities offered by Clementine under each of these headings.

In addition to methodology support, in the latest release there is also workgroup support, which is provided through the SPSS Model Manager add-on. This makes it possible for a workgroup to share its models, streams, and results in a common repository. The repository, which provides version control, check-in and out, permission support and search capabilities amongst other features, has its own administrative interface.

## Business understanding

In practice, of course, there is little that Clementine can do to assist in business understanding, at least in any a priori sense. However, SPSS does offer a number of Clementine Application Templates (CATs), available as add-on modules, which encapsulate best practise and provide a lot of out-of-the-box functionality to gain immediate business advantage. Examples of CATs include:



- Web Mining CAT, which analyses on-line behaviour and includes facilities for:
  - » Web usage statistics.
  - » Site search optimization.
  - » User and visit segmentation.
  - » Activity sequence analysis.
  - » Responses prediction.
  - » Campaign performance measurement.
- Telco CAT, which targets improvements in retention and cross selling for the telco vertical with pre-built modules for churn and cross-selling.
- CRM CAT, which includes pre-built modules for customer value, RFM response modelling, and customer segment migration and attrition.
- Fraud CAT, for the prediction and detection of fraud instances in financial transactions.
- Microarray CAT for accelerated life sciences work.

Each of these CATs consists of five major components: a realistic set of sample data, a number of pre-built streams (models) that are based on industry best practices, documentation and help structured according to the CRISP-DM methodology, annotative help, and mapping tools that have been designed to assist in the process of customising the CAT to your own environment.

## **Data understanding**

There are really two aspects to data understanding: the extraction of data and the examination of that data for its utility in the proposed data mining operation. In the latter case, many of the techniques used for examination are essentially the same as those used for visualisation purposes during the evaluation phase. Thus, while SPSS lists 3D, panel and animation graphs, for example, as data understanding features, these features might equally well be used at other stages within the data mining process. For convenience we will discuss all of these visualisation techniques within the section on Evaluation below.

As far as data extraction is concerned, Clementine supports a number of methods for accessing miscellaneous data sources. At the simplest level, the product supports both ODBC access to database sources as well as import facilities from file-based data sources. Alternatively, users can submit SQL queries to relational databases. Some aspects of pre-processing, such as table joins, are delegated by Clementine's SQL optimisation to the database itself, which should provide



superior performance. External data sources are also accessed and manipulated through the product's own language, CLEM (this is discussed further in the section on Data Preparation).

A major feature that was introduced in Clementine 7.0 was its integration with LexiQuest text mining. Text mining has emerged recently as one of the hot spots in analytical applications, and SPSS has a proven and mature offering. This text mining technology uses Natural Language Processing to work at the level of concepts rather than keywords. Thus "customer satisfaction", for example, is treated by the software as a single concept rather than as two undifferentiated words. The product works by automatically generating concept-based indexes against each document and record in the database, and then by classifying these concepts into separate categories and by performing frequency counts against concepts. As far as the classification of concepts is concerned, some of these are pre-defined, such as people, organisations, products and locations while you can also add your own categories if you wish. Text mining techniques can be used directly from within Clementine, and concepts, categories and frequency can be inspected independently or linked into structured data mining. You can also retrieve relevant documents directly from the Clementine user interface.

Text mining in Clementine has been advanced in this release with the separation of the analysis from scoring, in order to refine and speed up the process. Within the analysis phase key concepts are identified, those concepts are ranked and they can then be included or excluded from the scoring process, which enables the scoring to be more readily deployed and more rapidly executed.

## Data preparation

Data preparation (and retrieval) is performed through Clementine's 'data manipulation' operations, of which an important part is the CLEM expression language. This can be used in conjunction with operations such as record selection and attribute derivation and it provides a wide range of mathematical and data handling functions, including selection, sampling, merging, sorting and the aggregation of records. It is also used in data cleansing operations and provides data balancing functionality such as reducing any 'skew' in a set of values, as well as dealing with missing values in records.

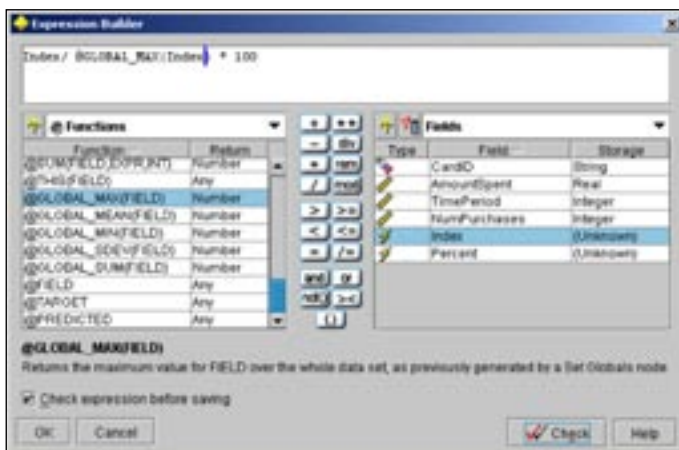


Figure 2: CLEM expression builder

Historically, CLEM has largely been the domain of experienced users. However, with version 6.5 SPSS introduced its CLEM expression builder. An example illustrating the expression builder is shown in Figure 2 but, to put it simply, the expression builder is to CLEM what 4GLs were to conventional programming languages such as COBOL. That is: much, much easier to use, especially for inexperienced users.

A major feature of the latest release is a facility called the 'partition mode'. This is an automated (single step) function that manages the task of splitting data into training



and test data sets; or training, test and evaluation sets. Historically, this was a time consuming process that added little value to the business so this represents a significant step forward. It will be especially beneficial as it allows expensive analysis time to be re-distributed to areas of activity with direct business benefit.

## Modelling

Modelling (and visualisation) is at the heart of Clementine. Clementine is a fully graphical end user tool based on a simple paradigm of selecting and connecting icons from a palette to form what SPSS calls a 'stream'. This differs from a 'process model' because a stream may consist of any number of different attempts to analyse the data under consideration and the 'model' may therefore include both unwanted and disconnected branches (though the software will prevent you from defining impossibilities). In effect, the environment is more like that of a canvas upon which the user tries out ideas (stream of consciousness), with the current path through the model being highlighted in colour. It should also be noted that streams encompass other parts of the CRISP-DM method, data preparation for instance, that go beyond just the modelling phase.

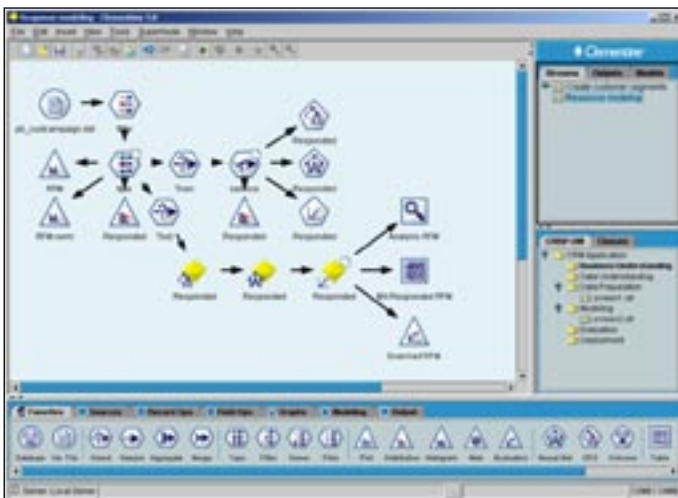


Figure 3: Clementine's canvas/process model approach

Streams support the idea of a process model in that proven processes and models can be stored for reuse. Moreover, you can have multiple streams or processes open at the same time. This means that you can switch between proven models and ideas that you are trying out, without the latter interfering with the former. An example of this canvas/process model approach is illustrated in Figure 3.

As illustrated, process nodes are represented by icons of several types, catering for different operations and items such as connecting to data sources, performing operations on data, predictive modelling, graphing and reporting. Once selected and linked, the software prompts the user to input relevant parameters and then automatically invokes the relevant procedures. The Windows-based paradigm uses the ubiquitous double-click to bring up additional options for a node, for example to invoke the CLEM Expression Builder. A number of new node types have been added in the latest release, particularly to support the deployment of text mining.

As far as algorithms are concerned, SPSS does not believe in a single silver bullet and it supports a range of algorithms that include, but are not limited to:

- Neural networks—Kohonen Networks, Multi-Layer Perceptrons and Radial Basis Function Networks.
- Rule induction—C5.0 and C&RT, both of which are decision tree algorithms. There is also a graphical decision tree browser so that you can select the most intuitive way to view decision trees. In the latest release, there are new decision tree algorithms supported, Quest and Chaid (both standard



and exhaustive versions), which are more sophisticated algorithms for the analysis of complex multivariate situations, with less danger of over-fitting. There is also support for interactive trees, which provides a means of developing decision trees in a stepwise fashion enabling business insight to guide decisions on how to split the branches of the tree with an evaluation of each step being provided by a gains chart to ensure that the model remains predictive and of value.

- Regression modelling—which uses linear regression to generate an equation and a plot. Logistic regression is also available.
- Clustering—K-Means and TwoStep Clustering (the latter provides good performance and can suggest the optimal number of clusters for a dataset). These, together with the clustering-related Kohonen Network models, provide a graphical browser that allows you to understand the meaning of the clusters you have discovered.
- Association rule discovery—Apriori Association Detection and Generalised Rule Induction find links between related attributes (and are often used in basket analysis).
- Sequence Detection—this is an extension to association in the sense that it discovers associations that exist over time.

It is also important to appreciate that you can combine algorithms within a single model. This is particularly useful since no algorithm is perfect and this allows you to compensate for any weaknesses.

By default, Clementine builds predictive models without the user having to specify technical details on how the mining techniques will be implemented. Based on the input data, the software makes an intelligent choice of the appropriate algorithm and learning parameters, and configures the tool accordingly. However all users can select some high-level options such as whether to aim for generality or accuracy.

Expert users, on the other hand, may select their own on-screen tab, which will give the user much finer control over parameter setting. For example, Clementine supports multiple training strategies for neural networking and the expert user can select which one to use, and modify the technical parameters of each. While on this topic, it is worth mentioning that training can be stopped automatically, and Clementine is able to detect overtraining and revert to the best state obtained.

## **Evaluation**

Evaluation is all about visualising the results of the data mining process and, as we have previously noted, this is also very important in understanding the data. As one might expect from a company that has historically specialised in statistical manipulation and the graphical representation thereof, this is an area of particular strength in Clementine.



A brief list of generic visualisation capabilities includes tables, distribution displays, plots and multi-plots, histograms, webs (in which different line thicknesses show the strength of a connection, with additional facilities for weak connections and automatic layout capabilities) and matrices, as well as the panel and animation graphs mentioned previously. In the latest release, SPSS has added further capabilities with such things as scatterplot matrices, parallel coordinate maps, heat maps, linkage analysis plots, and so on. In addition, specific evaluation capabilities include Gains, Lift, Response, Profit and ROI charts, and we have already mentioned the use of graphical decision tree browsing. Additional detail can be displayed by clicking on relevant displays. For example, with a web diagram you can click on a connection to see a description of its strength and the number of records involved.

Some visualisation techniques are available in 3D as well as 2D, and you can overlay multiple attributes onto a single chart in order to try to get more information. For example, you might have a 3D scatter diagram and then add colour, shape, transparency or animation options to make patterns more easily discernible.

In addition to individual graphs, Clementine provides a 'data audit' node, which allows you to get an overview of a whole dataset in one report, including thumbnail graphs, statistics and target overlays for each field.

Perhaps even more significant is the degree of interaction that Clementine provides to the user, which is available for all types of graphs and displays. For example, you can select a region on a plot by dragging with a mouse, which will automatically select the records corresponding to the defined region.

## Deployment

Output data, together with relevant predictions, can be written to files or exported to ODBC compliant databases as new tables or appended to existing ones. It is also possible to use batch mode for client-less operations.

Perhaps the most commonly used deployment options are via the Clementine Solution Publisher. This is used when you want to redeploy a whole scoring stream, including data access definitions, data preparation requirements and the model combinations that are then to be used. By using a Publisher node within the process model you can automatically capture this information for subsequent deployment either on another platform or as an embedded facility within a customised application. In either case, for example in a call centre application, you call the Clementine Runtime to process the resulting files.

Generalised web-based support is available, with the ability to present results in HTML format so that they can be viewed across the enterprise via a browser. In addition, Cleo is a specialised tool that provides the means to build simple web front-ends that you can use to deploy analytical applications. Since the acquisition of DataDistilleries SPSS has implemented Predictive Application Wizards that take streams and deploys them directly into the various packaged analytic applications (PredictiveCallCenter et al).



In some instances, a model-only solution is sufficient and in this case models can be exported in PMML 2.0 (Predictive Modelling Mark-up Language, an XML-based industry standard) and embedded in customised applications. SPSS has long supported deployment of PMML models via its SmartScore component, and has now branched out to support deployment through third party products such as IBM DB2 Intelligent Miner Scoring.



## Summary

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As the market for advanced analytics continues to grow, with all vendors in this segment recording strong double-digit growth in the last few years, with Clementine, SPSS is continuing to justify its position as one of the leaders in the market.

Clementine, in its latest guise, provides key features of use to business today, notably web analysis and text mining. The direction that SPSS has for the product—enhancing its integration with the enterprise BI infrastructure, as epitomised by the facility to enable in-database data mining with Oracle, IBM and Microsoft—is in building strong partnerships with key vested interests, and this serves to differentiate Clementine from its key competitor SAS, with Enterprise Miner.

The acquisition of DataDistilleries, that has done so much to reinvigorate the capability of SPSS in the enterprise space, is clearly highly beneficial in enabling the deployment of models from Clementine within the predictive enterprise. Finally, enhancements to the product are being made in all of the key areas of productivity, functionality and management.

All of which leads to the inevitable conclusion that Clementine is a product worthy of serious consideration: all current users can continue to rely upon it with assurance and all potential users should include it on any evaluation short-list.

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