AroniSmartInvest™

AroniSmartInvest User's Manual and Help System

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AroniSmartInvest	
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Introduction to AroniSmartInvest™

This chapter introduces you to AroniSmartInvest™,
a unique investment and stock analysis tool designed
for individual investors using MacOS platforms and
the Internet

Getting Started

Thank you for selecting AroniSmartInvest™, a high-performance stock
quantitative analysis and segmentation tool built for the Mac OS
platforms. We recommend that you read at least Chapters 1 through 3
of this manual to familiarize yourself with the installation and basic
operation of AroniSmartInvest™. You may also wish to read or skim
any other chapters that cover features you frequently use. Softwares,
especially this, are most useful when used. In fact, as and because you
use it, you make better and informed investment decisions.

What is AroniSmartInvest™
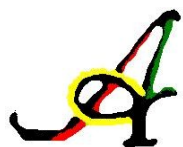
roniSmartInvest is a powerful quantitative and analytical
segmentation intelligence tool adapted to stock markets
and investments. It is built on proven sound and cutting
edge statistical methodologies. Yet, it is simple to use and
intended for the mainstream audience. Unlike other general purpose
investment statistical or financial application tools, AroniSmartInvest™
gets to the point. It is designed for helping the investor select the most
promising stocks at any given time: that is what it does and it does it
very well. AroniSmartInvest™ does not focus on fancy and noisy or
complicated models: it is a simple, yet powerful decision making tool at

the disposal of the investor. At the same time, it provides other features to support the core function of stock segmentation and analysis.

To learn about AroniSmartInvest™ strengths: you can only learn about the strengths of AroniSmartInvest™ by using it, making investment decisions to select a stock portfolio, and seeing the performance results by tracking the selected portfolio of stocks.

How To Use AroniSmartInvest™

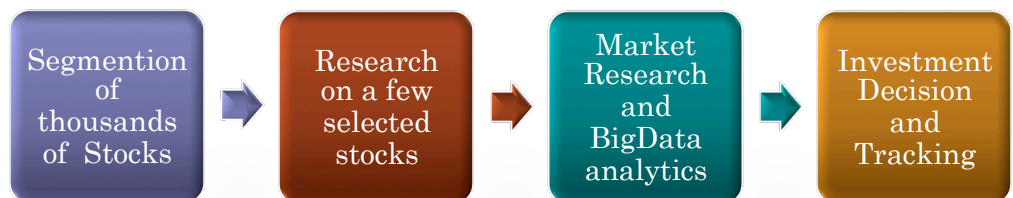The general purpose of AroniSmartInvest™ is to discover or explain group structures of Stocks described by multivariate data sets with unknown (segmentation, cluster analysis or clustering) yet predictable classes. It is an exploratory data analysis tool for solving segmentation and clustering and classification problems, with proprietary algorithms dedicated to stocks. At the same time, with AroniSmartInvest™, it is possible to focus on a small selected set of stocks, make investment decisions, constitute stock portfolios and track the performance of a portfolio.

KEY TERMS
- Classification
- Segmentation
- Clustering
- Unsupervised

Hence the tool may be used in multiple ways. In the first approach, the investor knows a priori what stock segments are most useful, and wants to classify stocks in either of the segments. That is classification or discriminant analysis. In another approach, and the most common or interesting, the investor knows little about the stocks segments and wants to make an unguided segmentation. That is clustering. This individual client based application focuses on the most interesting option: segmentation.

AroniSmartInvest™ approach is as follows:

Segmention of thousands of Stocks → Research on a few selected stocks → Market Research and BigData analytics → Investment Decision and Tracking

Segmentation and Clustering
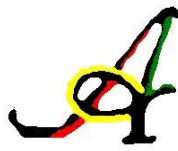
Each stock has a multitude of variables that describe it at every single moment of the day, up to minutes and seconds. Multiply that massive information with thousands of stocks available to the investor and one may imagine the magnitude of the task in front of the individual investor faced with the decision to select a few promising stocks in which to invest. AroniSmartInvest is the tool for that moment and the place.

To illustrate this, consider the following example. The investor has some cash to invest in stocks for a short term. The goal is to select a few stocks, that may bring money on the short term, if sold back. Unfortunately, the investor is faced with thousands of stocks to select from in a short period of time. If the investor waits too long, there may be a missed opportunity. If the investors makes an uninformed or suboptimal selection, they may lose money. The interest here is to quickly make informed decision and identify subgroups of fast growing stocks, buy them at their rising trend and sell them after making a good profit.

KEY TERMS
- Stocks
- Research
- AroniSmartInvest
- Portfolio of Stocks

Corollary, if stocks held in a portfolio no longer meet the selection criteria, the investor may review these stocks and decide to unload them. AroniSmartInvest™ helps to discover a group structure in the data with unknown class (cluster analysis) and pick key stocks to buy, or at least a number of stocks manageable enough to do an in-depth ad-hoc analysis, for example on variables such as management strength, new events in the market, and need for diversification.

The identification of significant classes or segments, the classification to the segments, and the choice of key promising stocks can be automatically done by AronSmartInvest.

Human Interface

AroniSmartInvest™ is interactive and built on the powerful Apple®'s MacOS® tools: Cocoa and Xcode®. The user's experience is enriched by MacOS® interface ease of use and look and feel. Menus and navigations are intuitive enough for users. Some menus and buttons open other functionalities for advanced and/or refined selections to improve selection or access more features.

The navigation through AroniSmartInvest™ is done by a combination of intuitive elements organized as:

- **Buttons:** usually buttons are associated with a specific action. The text on the buttons specifies the action taken if the button is clicked.

- **Check boxes:** these are special buttons used to select options. The options are specified by the text associated with the check box. If a check box is selected, then the associated option is chosen.

- **Context menus** show up in some instances and guide the user through a series of steps and actions.

- **Warnings and dialog boxes**: these inform the user of the action taken or to be taken.

- **Dialog boxes** may also be launched in preferences panels for additional options selection.

Support Services

The Support area of our web site offers up-to-date information on AroniSmartInvest and all our other products: http://www.aroni.us/. You'll find a wide range of information there, including:

Frequently Asked Questions (FAQ) — Information and answers for commonly encountered questions and problems. We strongly recommend you check the AroniSmartInvest FAQs before resorting to any other means of inquiry.

Product Updates — The latest maintenance versions of our products will be announced on the support page when available, as well as access to plug-ins and other materials.

How to contact us

If you're using AroniSmartInvest and can't find the information you need on our web site, or if you encounter any problems with the software, please use the contact form on our web site: (http://www.aroni.us) or send email to: aroni@aroni.us

We do not offer telephone support for AroniSmartInvest. Please refer to the support resources available on our web site for information and assistance, or contact us via email.

Installing AroniSmartInvest

This chapter tells you how to install AroniSmartInvest on your Macintosh. It also describes the files AroniSmartInvest creates, where it puts them, and how to install or remove optional components of AroniSmartInvest.

Basic Installation

AroniSmartInvest is supplied as a single application file. Specific system requirements, installation instructions and supporting files are described below

System Requirements

AroniSmartInvest requires Mac OS X 10.9 or later. The software may not run on Mac OS 9, or any earlier versions of Mac OS X. Internet access is required for some modules. These modules and/or their dependencies may not work without Internet access. The system uses Cocoa native viewers to browse Internet.

Installing AroniSmartInvest

AroniSmartInvest is distributed by Apple App Store™ or in the standard Mac OS X disk image format (a ".dmg" file), or may be available on demo CD-ROMs or downloads from AroniSoft LLC websites. To install AroniSmartInvest downloaded on distributed on CD-ROM, just drag the "AroniSmartInvest" icon from the disk image or CD-ROM to the Applications folder on your hard drive.

AroniSmartInvest's Application Support Folders

AroniSmartInvest may make use of an application support folder to store and organize a variety of items that add functionality. Such items are kept in subfolders according to their purpose.

AroniSmartInvest's application support folders will be present in the sandox environment, usually in "~Library/Containers/us.aroni.aronismartInvest"

Use of the ~ character in a folder path description is the customary Unix shorthand for the location of your home directory. If written out in full, this path

would be "/Users/<username>/Library/Containers/us.aroni.aronismartInvest"

Chapter

3

Working With AroniSmartInvest

Launching and Starting AroniSmartInvest

To launch AroniSmartInvest, double-click the AroniSmartInvest application icon. At launch, AroniSmartInvest will look for a SQLite3 database, named "StocksDB.sqlite", of stocks which should be located in local application folders.

If the database is found, then it is used. Otherwise, AroniSmartInvest will install the default database "StocksDB.sqlite" supplied with the application. The user will only be able to update the SQLite3 installed in the local application support folders.

AroniSmartInvest then loads the data from SQLite3 database into the appropriate tables. AroniSmartInvest user interface has several modules organized into tabs. The module components, explained in the sections below are:

- **Stock Profile and Financials: this is the main module from which all other modules are accessed.** The module splays stocks, including company name, industry, sector and financial fundamentals. This module is always visible in the main window. From the same module, it is possible to add and update the stocks and refresh publicly available data from the web.

- **RSS Feeds and News:** From the module it is possible to subscribe to RSS Feeds of interest and track financial and other news on select investment and financial websites for further stock analysis.

- **Segmentation Analysis: This module is dedicated to stock Segmentation and Segment Analysis:** That is where the segmentation of stocks is performed. The module also displays identified stocks segments and their profiles.

- **Historical and Market Profile Analysis:** displays historical performance for a given stock. The module also allows to display the market profile of a selected segment.

- **Portfolio Manager:** Where a user may create and track stock portfolios

AroniSmartInvest Modules

StocksDB.sqlite Structure.

One of the key pillars of AroniSmartInvest is the database of stocks. The database has multiple tables. The SQLite 3 database is provided as a template with information valid only at the date of the application production. This information should be updated with the values the user may need. The SQLIte database may be updated directly by users who subscribe to data providers. AroniSmartStat does an automated download from the Web, using Yahoo® public data.

The SQLite instance is meant to be dynamic and the user is expected to update the information as needed. All the data supplied with the tool are for illustration purposes only and to be able to install the Application. Some data sources are subject to restrictive use.

Some data are displayed within the tools, while other data is used in the "proprietary" model developed for AroniSmartInvest™. However, the users may enter their own data in SQLIte3 database, making sure that all the columns on the database have relevant data. The users may also adjust the model using some features supplied with the tool.

Please note the terms from Yahoo! Finance and Google before updating data. The web refresh update follows these guidelines, and the users are expected to follow the same guidelines.

Stock Profile Module.

In this module, AroniSmartInvest displays the latest relevant financials for the stocks **Stock Profile Module displays default fundamentals for stocks** captured in SQLite 3 database. details of all the stocks captured in SQLite 3 database**.** As the user updates the SQLite3 database table, stock quotes are added or removed from the list. The user is responsible for keeping the quotes up to date either by a manual refresh or by clicking **Web Refresh Stock Data** button. AroniSmartInvest does not guarantee that the **Web Refresh Stock Data** will always work. The user must abide to data supplier terms and licensing. **Web Refresh Stock Data** follows the guidelines from Yahoo! Finance.

The latest detailed quotes for each stock included in the **database** are displayed by default. The user may automatically refresh data from the Web by pushing the "**Web Refresh Stock Data**" button. The existing data is automatically overwritten. The user may also manually change (add or remove stocks) in the SQLite 3 table using appropriate tools.

Restarting the application is not usually required but may be needed to display the updated information.

As the user updates the SQLite3 database tables, these stocks are added or removed from the list. The user is responsible for keeping the list up to date.

In Figure 3.1, a screen shot of the tab shows the following buttons: **Refresh Table, Add New Stock, Delete Selected Stock, Update Edited Stock, Update Stocks List With Saved Data,** and **Web Refresh Stock Data**.

Clicking **Refresh Table** launches an action to refresh data, in case the data was changed while the program is running. Clicking **Web Refresh Stock Data** updates the stock quotes data from the Internet. The data will be displayed in the table on the left and the form at the top.

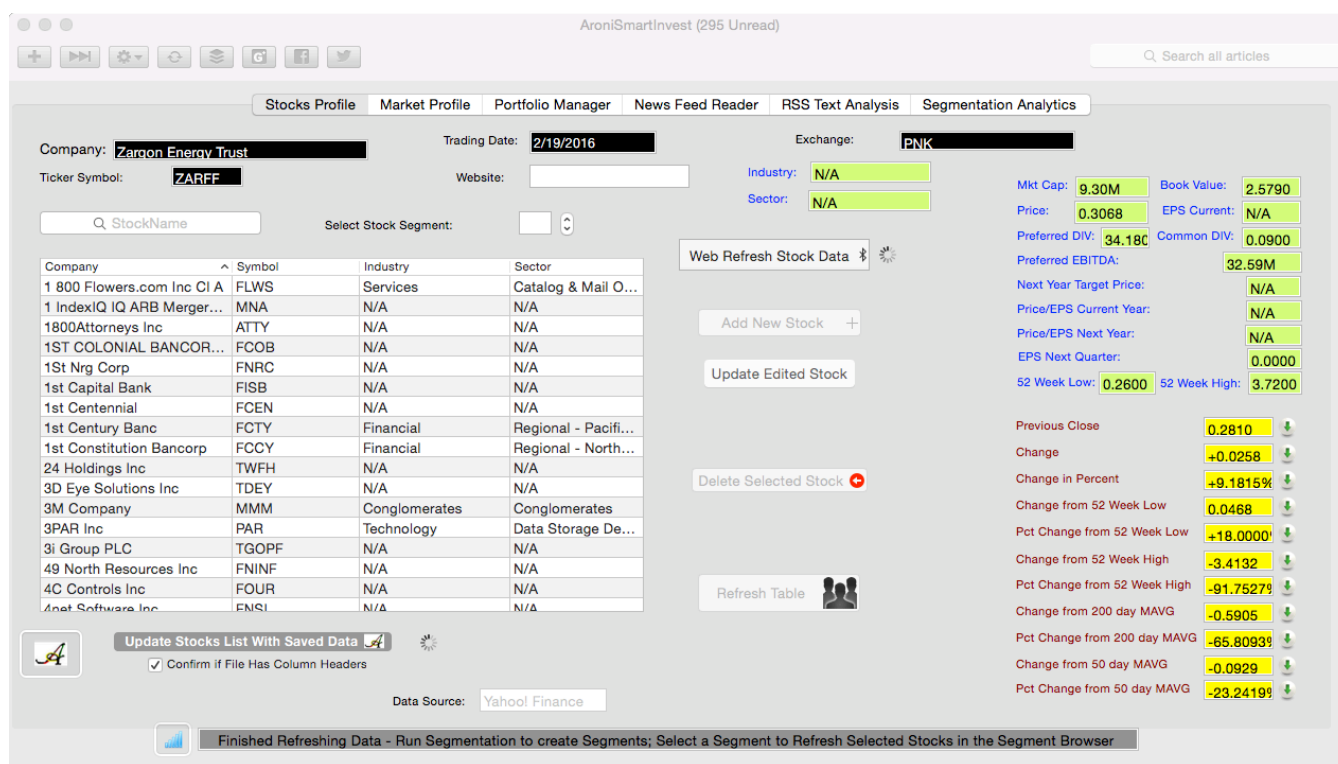FIGURE 3.1 AroniSmartInvest™ Stock Profile interface. At the top, the titles of the modules are shown as tabs. Select the tab to move from Module to Module and access the functionalities of each module. Some modules require connection to Internet. AroniSmartInvest™ requires Internet Access to be able to use the most current data.

The main module displays by default the fundamentals for each stock included in the database.

Updating stock information, adding or deleting a single stock to the database:
Edit a given stock and push "**Update Edited Stock"** button to update a stock. Use "**Delete Selected Stock"** to remove the stock from the database and "**Add New Stock**" to add a stock to the database. Pushing "**Refreshing Table"** button is required to display the updated information. Sorting and searching functionality is implemented in the table

Adding stocks from an external file:
Stocks are deleted and/or added in the market. To add multiple stocks at the time requires a comma separated vector (csv) file with at least a few specific fields. Push "**Update Stocks List With Saved Data"** button to open the file. Click the "**File has column headers"** button in case the file has headers in the first row. Otherwise, the application assumes that there is no header row and the columns are organized in a very specific order indicated by the message. Pushing "**Refreshing Table Data"** button is required to display the updated information.

Sorting and Searching functionality is implemented in the table at the top. A filtering by stock segments is also implemented. Use **Select Stock Segment** field and stepper to filter by Segment.

Market Profile Module.

The "**Market Profile**" module helps analyze the historical performance of a stock selected by the user in a time frame set using the controls shown in the tab. The module also allows to perform "Market Profile" analysis on a selected stock.
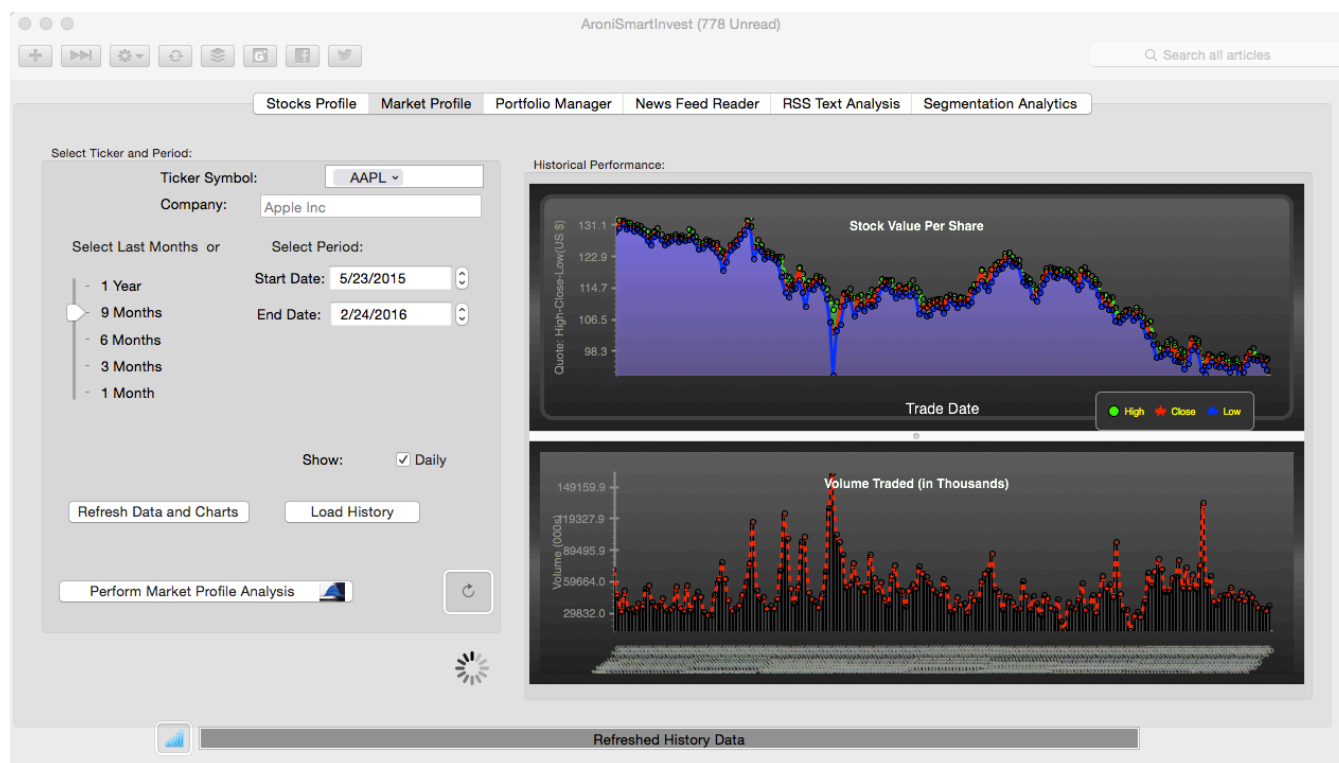
FIGURE 3.2-A AroniSmartInvest interface. The Market Profile tab is divided into three parts: History selection section ,charts showing the historical volume and stock quotes: High-Low-Close, market profile analysis.
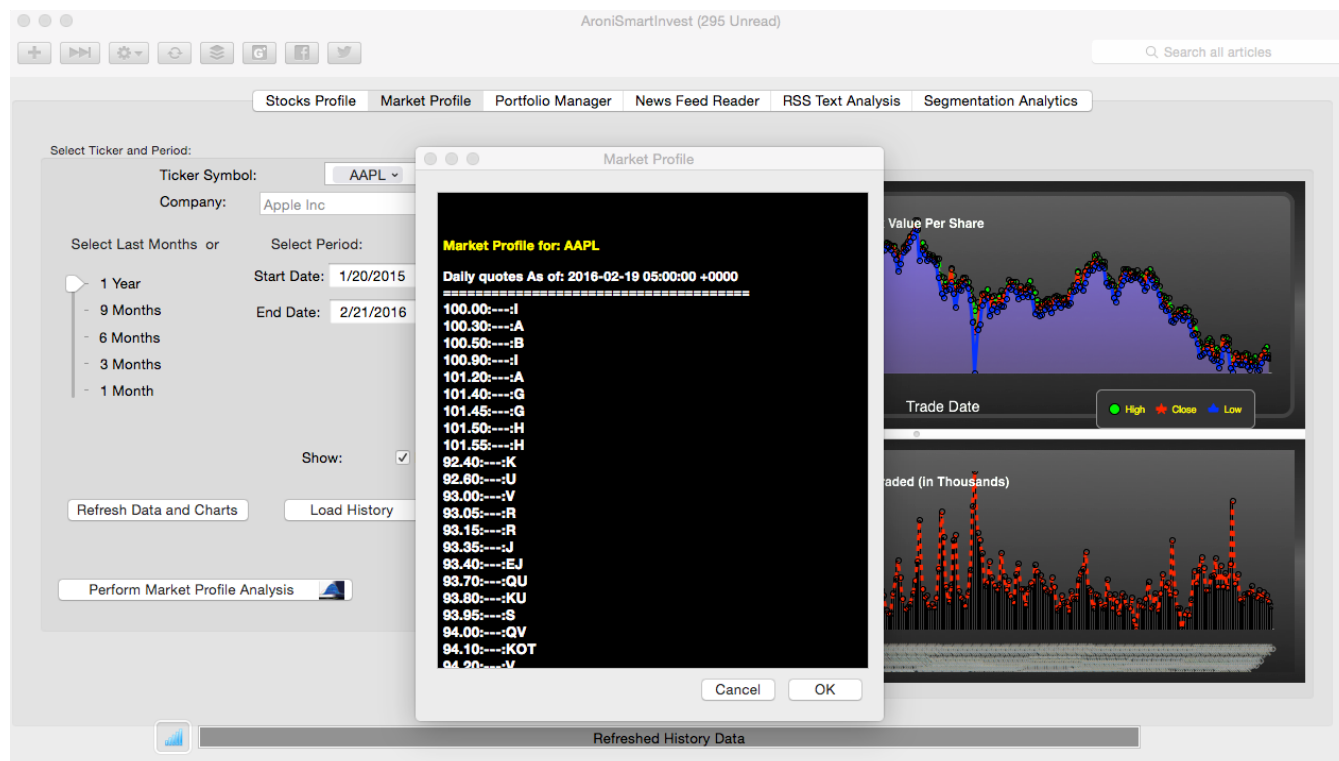
FIGURE 3.2-B AroniSmartInvest interface. The Market Profile Analysis tab is divided into three parts. By pushing the Market Profile button, a market profile analysis of the selected stock is displayed in a separate panel.

Market profile module displays historical quotes for a selected stock on a selected period.

An internet connection is required. The tab has two parts: A table listing the historical quotes by date for the selected segment and two charts included in "Historical Performance" box showing volume at the top and the High, Low, Close quotes for the stock over the performance period.

It is possible to show daily or weekly performance. The module is used as in the following steps:

- **Step 1:** Select a stock by typing the symbol in the Ticker Symbol text field. A drop down list of similar ticker symbols is proposed. Select the right symbol. The Company text field is populated by the name of the company corresponding to the ticker symbol

- **Step 2:** Select a start and end date of the period

- **Step 3:** Select Daily (selected) or Weekly (not selected) by clicking on Show check mark

- **Step 4:** Click on the button "Load History" to download data from the internet

- **Step 5:** Click on the "Update" button to populate the table and update the charts

Alternatively, a slider allows to select 1, 3, 6, 9, or 12 month-history.

Only one stock is selected at any given time. Daily or weekly quotes are displayed by changing the state of **Daily** check box.

The investor may select other stocks to display, one at a time. The data in the table is overwritten and the charts are updated with the new dataset.

Portfolio Manager Module.

Portfolio Manager Module helps user to create and update stock portfolios and watch lists, and track their performance .

With the "**Portfolio Manager**" module, the user is able to create and track the performance of Portfolios or watch lists. By default a list of possible portfolios or watch lists is proposed. The user may add or delete portfolios, add or delete stocks and refresh portfolio performance data from the web resources.

The Module has four parts:

- **Portfolio:** A browser listing portfolios. This is where the portfolios created are listed. Once the user selects a portfolio, the information on all the stocks included in the portfolio is

displayed in the table next to the browser. Use "Shift + Left Mouse" to select a range of portfolios.

•   **Table showing stocks in a selected portfolio.** The name of the selected portfolio is displayed in the text field: Portfolio Name, on the top of the table. The table only displays the data entered by the user.

•   **Table showing the latest quotes of the stocks included in a selected portfolio**. Select a portfolio from the browser and the click "**Portfolio Performance**" button. An internet access is required to update portfolio performance.

•   **Table showing all stocks in all portfolios**. That is where stocks profiles are created and stocks are added to portfolios. Use the form above the table to add or update the stock data. A stock can only be included in one portfolio. The buttons + and – below the tables can also be used to add or delete a stock. The "Save" button saves data into a store or flat file. But normally the data is saved in the data model in the Application Support folders.
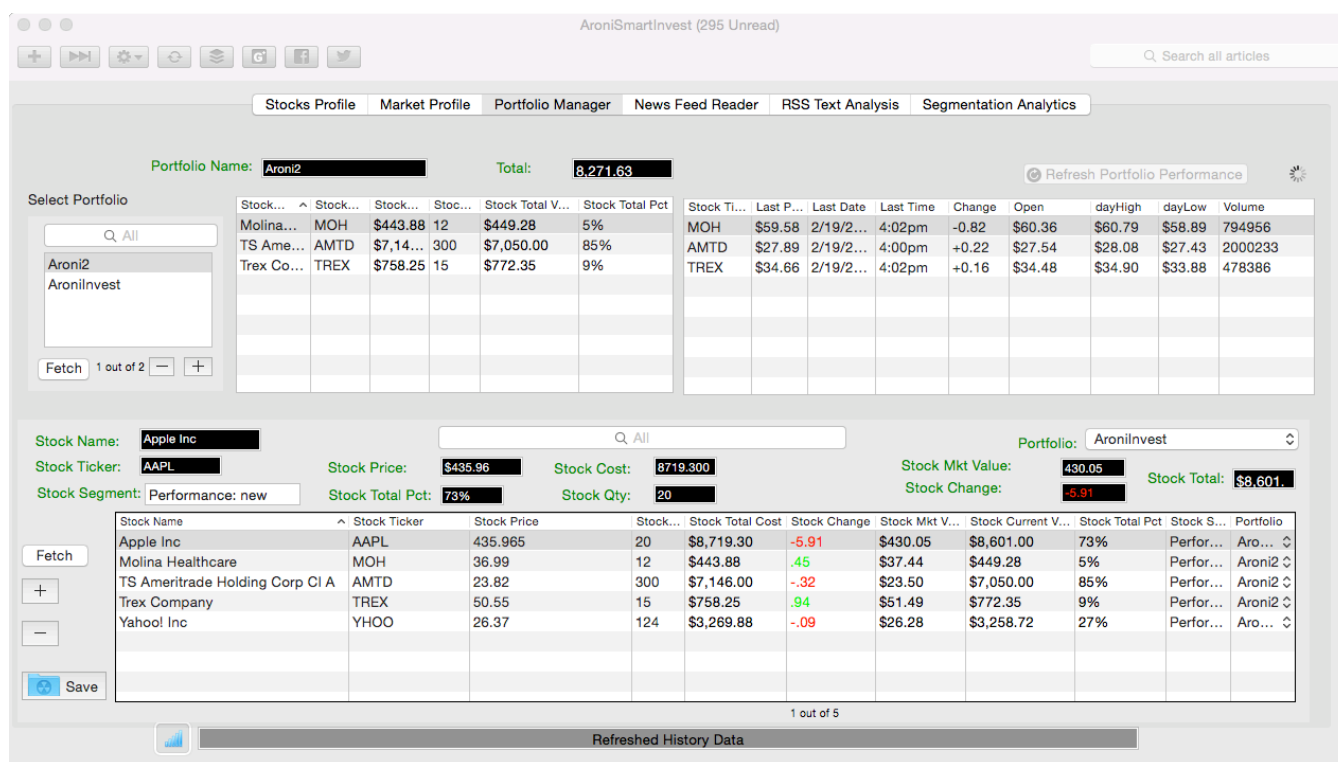

FIGURE 3.3 AroniSmartInvest interface. The Portfolio Manager tab is divided into multiple parts: Table showing the stocks in portfolios, browsers showing portfolios and tables showing portfolios and associated stocks. The Portfolio Performance button fetches data from the Internet.

News Feed Reader Module.

The RSS and News module helps the user to gather the latest news and market events that may impact the performance of a selected stock.

News Feed Reader Module accesses latest financial information and market events and news.

To access the News Feed Reader sub-module, click on **News Feed Reader** tab. The "**News Feed Reader**" module is dedicated to accessing web resources from financial and non-financial websites that implement RSS, including Google Finance, Yahoo Finance, Morningstar, MSN Money, CNN, Bloomberg, Bank of America, Vanguard, and Better Investing. RSS from several web sites may be added or removed as needed.

The **Feed** and **Entry** menus on the main menu allow the user to subscribe and manage the RSS feeds.
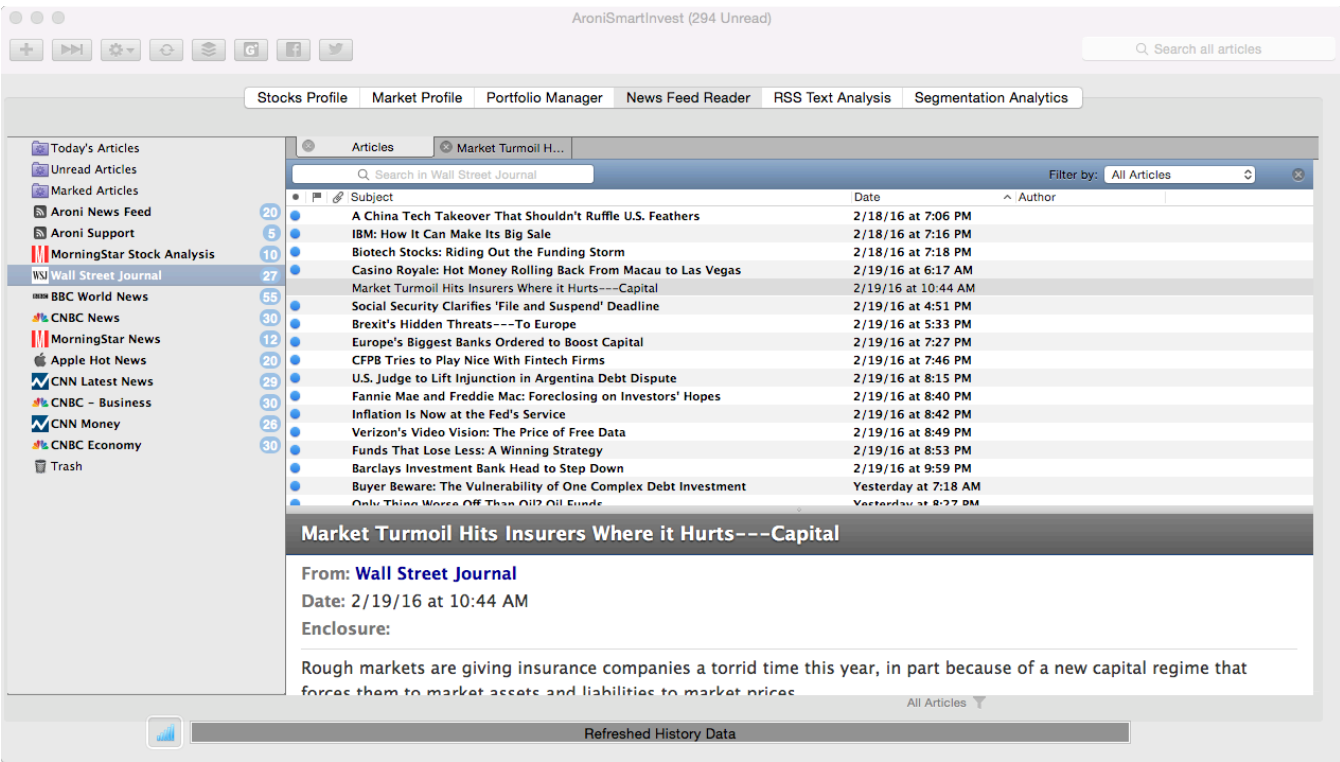
FIGURE 3.4 AroniSmartInvest interface for News Feed Module. The left bottom displays the RSS feed and entry information and allows to view the web content of each entry. It may take time to get RSS lists and content refreshed. Refreshing data from the Web requires connection to Internet. Use buttons at the top left to subscribe to RSS, refresh the feeds, or share on social media including as Google+, Facebook, Twitter

For this section, AroniSmartInvest requires Internet Access. Internet access is required.

RSS and Web News are displayed in this Module. Subscribe to and manage the RSS Feeds from the Feed and Entry menu on the main menu

From the main menu, select Feed menu to subscribe or unsubscribe or Entry to manage a feed. To subscribe, enter the RSS URL in **Feed URL** field and click **Add** button. Before clicking the button, make sure that that the web link to the RSS is valid. The RSS is added on the right of the RSS viewer on the list of RSS subscribed to. The browser on the bottom right is used to view the summary of the content of a specific RSS. Double-click on the selected article to read. A tab with the article content is created next to the "Articles" tab. Select the tab to read the article in the displayed web page.

To unsubscribe click on an RSS entry and go to **Feed** menu on the main menu, then **unsubscribe** menu. The RSS contents are also **refreshed** from the Feed menu.

BigData, RSS and XML Text Processing with AroniSmartInvest™ for Advanced and Professional Version

RSS Text Analysis Module in AroniSmartInvest™

AroniSmatInvest has a module dedicated to Text Analysis, especially text articles from RSS feeds. The RSS Text Analysis module addresses the needs of the customers and the savvy investors to harness the power of new technologies. One of the consequences of the advances in new technologies is the increasing prominence of BigData.

Big Data has been here and exploding. Businesses, individuals and the society have been slowly adjusting to the new trend in technology, data mining and analytics adapted to the needs of BigData. AroniSoft LLC, with its AroniSmart™ line of technological and analytical tools and methodologies, has been working to make sure our customers will be able to harness the benefits offered by BigData.

AroniSmartIntelligence™ has a module dedicated to BigData: Text Processing and Bayesian Models. The module is dedicated to analyzing text data and discovering network relationships among different variables and attributes. The module includes several Bayesian Network models, estimators and algorithms to deal with unstructured data. AroniSmartIntelligence™ models have been optimized for the needs of BigData analytics.

   To support text and unstructured data mining, the Text processing capability has been added in AroniSmartIntelligence Descriptive Analysis module. AroniSmartIntelligence™ allows the analyst to load plain text from various sources, organized in folders and sub-folders and create a dataset in "aroni" format, to be processed in the Bayesian Models, Regression Analytics, or Segmentation modules.

One of the various data sources is RSS feeds. Using AroniSmartInvest™ RSS Text Analysis module, it is possible to create a folder containing RSS entries, ready to be processed by AroniSmartIntelligence™ Text Processing module. AroniSmartInvest™ RSS Text Analysis module will process RSS content and create a file in "aroni" format. From there, the analyst

and the savvy investors will extract information and insights needed to make investment decisions using adhoc analytical skills and statistical models such as Bayesian Network, Econometrics, and Regression in AroniSmartIntelligence™.

AroniSmartInvest has also the capability to mine the text, identify important words and tags and create tag or word clouds. This is done using two models: String To Word vector and Naïve Bayes Multinomial Text analysis.
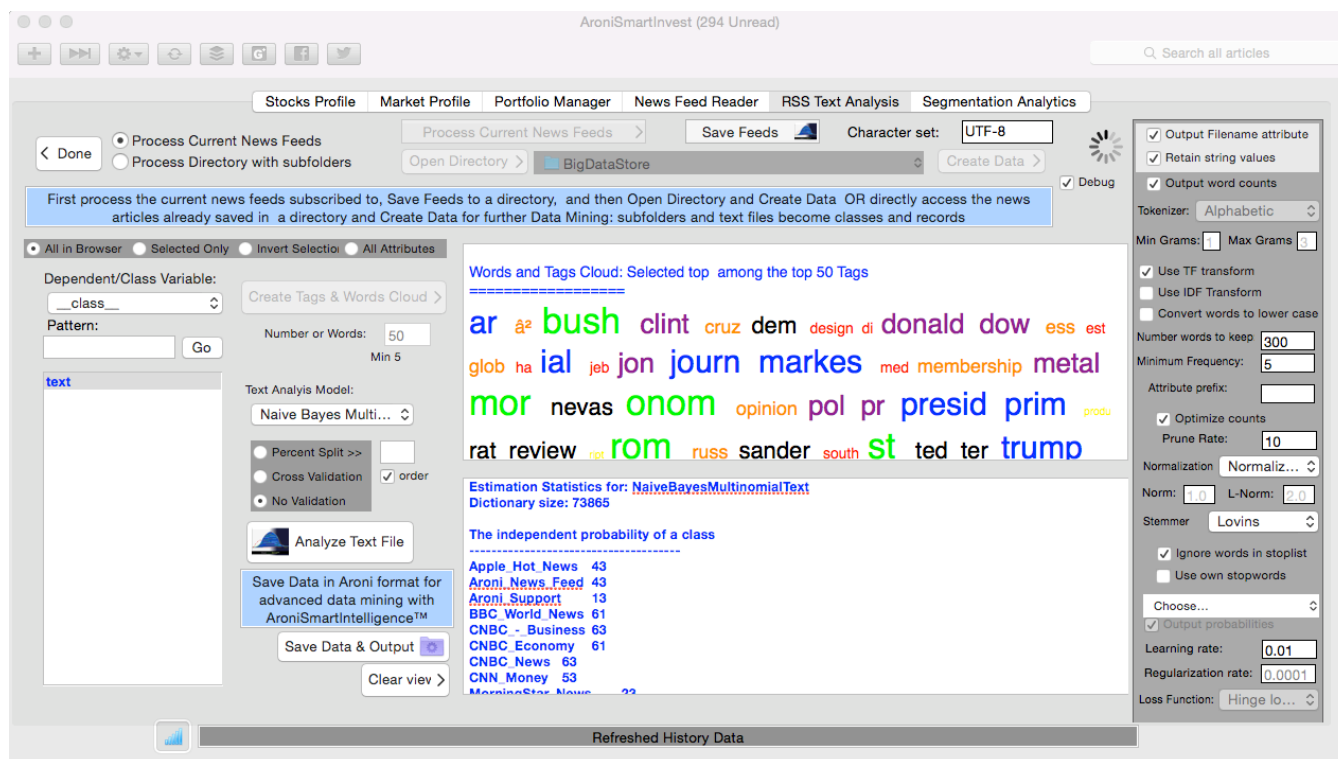

FIGURE 3.5 AroniSmartInvest interface for RSS Text Analysis   Module. The text viewer in the middle displays outputs from text analysis, including Tags or Words clouds, using advanced, but user friendly text analysis models.

To use the RSS Text Analysis module, select "**Process Current News Feeds**", then click "**Process Current News Feeds**". Processed unstructured flat text files corresponding to articles are created and saved in subfolders in the application folders, usually not readily accessible by the user. Each RSS Entry has its own subfolder.

To save the feeds in the accessible user directory, click on "**Save Feeds".** An Open panel displays and prompts the user to select a destination directory. Select an accessible directory, such as the user's home directory or "**Desktop".** A directory named **"BigDataStore"** is created and saved in the selected destination directory. Within the **BigDataStore** directory are the subfolders corresponding to the RSS feeds, and in each sub-folder are the flat files.

To analyze text files stored in flat files, saved within sub-folders , under a main folder, follow these steps:

- Select "**Open a directory with subfolders**" , click **Open Directory** and choose the main "BigDataStore" described above. This is the folder that contains the sub-folders where the flat files are stored.

  o Available options for processing directory:

    ▪ Output Filename: to output the flat-file name into the dataset

    ▪ Retain Attribute: to retain all the text in the files

    ▪ Character set: default: is UTF-8

- Select "**Create Data**". Once the unprocessed data is loaded, the controls to set options become enabled.

- Choose and select the Text files processing options. The options selected depend on how the text should be translated into the word vector. A number of options are available:

  o All text strings, except the __class__ variable will be transformed into word vectors.

  o Tokenizer: A tokenizer is an algorithm to split texts into words or tags/grams Three tokenizer algorithms are implemented: Alphabetic, word, and N-Gram. For N-Gram, set minimum and maximum number of grams (default is 1 and 3, respectively).

  o Word count: get the word counts rather than word presence flag (0 or 1).

  o Minimum Frequency: required minimum term frequency for word counts (default = 1)."

  o TF Transform, or Term Frequency: transform the word frequencies into $\log(1+f_{ij})$, where f_{ij} is the frequency of word i in the jth text file

  o IDF Transform, or Inverse Document Frequency: transform the word frequencies into f_{ij} *log(number of flat text files/number of text files containing the word i), where f_{ij} is the frequency of word i in the jth text file

  o Lower case: transform all words into lower case format

  o Ignore stop list: ignore the AroniSmartInvest™ internal stop list.

  o Use own stop list: provide own customized stop list file. The stop list file must be in a text format, with one word per line and comments starting with # or %

o Prefix: provide a prefix for the created variables (word attributes) names.

o Optimize count: do not enforce the maximum number of words and the minimum term frequency per __class__ (sub-folder), but based on the total number of text files in all the sub-folders.

o Number of words to keep: approximate number of word fields to create. The words beyond the specified number are discarded. Settings the number of words to keep waits untill the full dictionary is built. This requires huge memory and should be used with caution.

o   Prune rate: the rate (e.g., 20 for every 20% of the input dataset) at which to periodically prune the words dictionary generated from all the relevant words after applying stemming algorithms. This option is usually preferred over "Number of words to keep" for large text files or when memory size is of concern.

o Stemming algorithm: The stemming algorithm to use. Three algorithms are implemented: Lovins and Iterated Lovins

- Select a model from the "**Text Analysis Model**" popup button. Two models are available: String To Word vector and Naïve Bayes Multinomial Text

- Click "**Analyze Text File**" button. Depending on the size and complexity of the text in the file and the computer resources, the processing may take long time. At the end the processed data is displayed in the table and in the text viewer.

- "Tags or Words Cloud" is shown in the text viewer at the top.

- Click: "**Save Data and Output**" to save "Aroni" format version in a selected folder on the computer.

- Click: "**Clear View**" to clear the text viewer.

- There are options to modify the number of words or tags for "Tag or Words" cloud. Enter the number of words and then click " Create Tags and Words Cloud" button. The cloud is updated with the desired number of words/tags.

Segment Analysis.

This is one of the most important modules of the software. It is where the Stock segmentation model is setup and the stocks are classified into segments. This module drives the segmentation engine. **Stock Segmentation** uses the detailed variables in SQLite 3 database gives the option to set up the model.

From the screen, the user is presented with three areas corresponding to three actions: **Setup Segmentation, Selected Stocks by Segment**, **Segment charts.**

In "**Setup Segmentation**" areas, the user chooses the segmentation approach. There are two popup buttons: The top button with "**Fixed/Segments/…"** item allows to select the type of segmentation model: **a fixed number or a range of segments.** The lower button with "**Equal Covariance"** item allows to select the **covariance structure**. Advanced features are inactivated for this version by are available in the professional version. Advanced features allow professional users to change the model options and requires advanced financial, statistical and data mining skills and background. Users are encouraged to read the section on how to set up the Segmentation model. This individual client version focuses on the most important features of the segmentation analysis.

Stock Segmentation Module displays quotes for the stocks used in the Segmentation model and the Segments After choosing which type of segmentation model, the text fields and stepper button are used to select the number. For "**Fixed Segments/Groups**" model , **Min** and **Max** have the same number. For "Range of Segments/Groups", **Min** stepper and field apply the lowest and Max stepper and field the largest value of the range. The maximum number of segments should be less than 10.

After setting up the model, Click "**Run Segmentation".** Click **Ok**. Depending on the model options selected and the size of the data, the model may take several minutes to run and produce the results. So be patient and wait until the model system informs that the model has finished to run.

After the model has finished to run, Segments are automatically refreshed. The user may also push "**Refresh Table Data**" button to make sure the segments are refreshed.

FIGURE 3.3 AroniSmartInvest interface for Segment Analysis. At the top left of the module, buttons correspond to the actions that may be activated within the sub module. The browser in the middle shows the segments with a few selected best stocks for each Segment. The variables used in the segmentation are part of a proprietary algorithm.

The latest detailed quotes for each stock included in the segmentation model table are assumed to be in the database, along with the latest segments. By default, all segments are initialized to "-1", until a segmentation model is run. The system automatically refreshes segments from the SQLite 3 database. After running the model, the user may need to refresh the segments. Refreshed Segment profiles are given in this module, by examining at the charts that include some key ratio and financials.

NOTE: Stocks with unusually high share values or higly speculative stocks are NOT included in the segmentation. However they may be included in the database and in other modules.

 Segment Profiles.

The "**Segment Profiles**" shows not only the segments identified by the model, but also the best candidates for stock selection. **A table** listing the stocks by Segment is included and may be filtered in the main module at the top left.

The Segment profile section has four parts:

- **a pie chart** showing the portion of each segment of stocks,
- **three charts** showing key performance metrics for each segment and
- **a browser** showing the best candidate stocks for each stock.

Click on each pie or plot bars in the charts to have the legend displayed on the bottom left and the metric displayed in the Chart axis legend. Clicking again on the same plot returns to "Segments" label or select another plot.

FIGURE 3.4 AroniSmartInvest interface. The Segment Analysis Profile module is divided into four parts: Table listing the stocks by segment (top right in the main module), a pie chart showing the portion of each segment, three charts with key performance metrics for each segment and a browser showing the best candidate stocks by Segment. The segments assume that the model was run successfully and the Segments in SQLite 3 database were updated if a model was run. Otherwise the last segments in the database are used.

Segment Profiles Module displays segments identified, their profiles, and the best candidates

The model classifies each stock included in the Segmentation, to a unique Segment. If a user selects a Segment in the **Select Stock Segment** section at the top right of the main module, a list of all the stocks classified in the Segment is displayed in the table. The segments assume that the model was run successfully and the Segments in SQLite 3 database were updated if a model was run. Otherwise, the last segments in the database are used.

For each segment, the following values are plotted in the charts to the right. The values are as of the date of the data in the database. Hence, users are encouraged to refresh the data as often as possible prior to segmentation in order to use the latest available information.

In the Chart titled: "Segments Values and Moving Average", the following variables are plotted:

- **Values52WeekHigh** in black color: segment average of the stocks' 52 week High quotes

- **Value52WeekLow** in blue color: segment average of the stocks' 52 week Low quotes

- **ValuePreviousClose** in green color: segment average of the stocks' latest close

- **Value50dayMAVG** in red color: segment average of the stocks' 50 day quotes

- **Value200dayMAVG** in purple color: segment average of the stocks' 200 day quotes.

In the Chart titled: "Average Changes Over Moving Averages" the following variables are plotted:

- **Change52WeekHigh** in black color: segment average changes from the stocks' 52 week High quotes ;

- **Change52WeekLow** in blue color: segment average change from the stocks' 52 week Low quotes;

- **Change50dayMAVG** in green color: segment average change from the stocks' 50 day quotes;

- **Change200dayMAVG** in red color: segment average change from the stocks' 200 day quotes.

In the Chart titled: "Key Ratios Metrics" the following variables are plotted:

- **pricePerSales** in yellow color;

- **earningsPerShare** in blue color;

- **epsCurrentYear** in green color;

  - **epsNextYear** in red color;

- **pegRatio** in brown color.

The browser displays the best candidates for stock and portfolio selection

The browser where candidates stocks are displayed is the ultimate destination of the modeling efforts. The browser displays the list of the candidate stocks by Segment from which the savvy investors may select a portfolio of stocks. The list is

narrowed down so that the investor has only very few considerations to entertain before making a final determination. Such considerations may be needed for diversification, budgeting for investments, latest market events and news, macro and political variables, etc. Other modules will hence help narrow down the selection. The browser only lists the stock ticker symbols, the names being listed in the table of stocks by segments.

To drill down into a given Stock Segment displayed in Select Stock Segment text field, the user may choose to analyze the historical performance and market profile of key segments by selecting the tab "**Market Profile",** "**RSS and News**" or "**Portfolio Manager**." "**Market Profile"** and "**Portfolio Manager**." modules are described in the sections below. Which module to launch depends on the user's needs.

Once the model has finished to run, segments are displayed and the user may find details in the output files, especially aroni.out located in Application Support folder.

Setting Up and Running Segmentation Model in AroniSmartInvest for Advanced and Professional Version

Setting Up the Segmentation Model AroniSmartInvest

The driver of AroniSmartInvest is an advanced and complete segmentation model. The model is configured through an intuitive, user friendly interface. The interface is launched by clicking "**Setup New Segmentation**" button in "Stock Segmentation module

The action opens a panel, populated with defaults values. The user may opt to run the model with defaults values or customize the options before running the model.
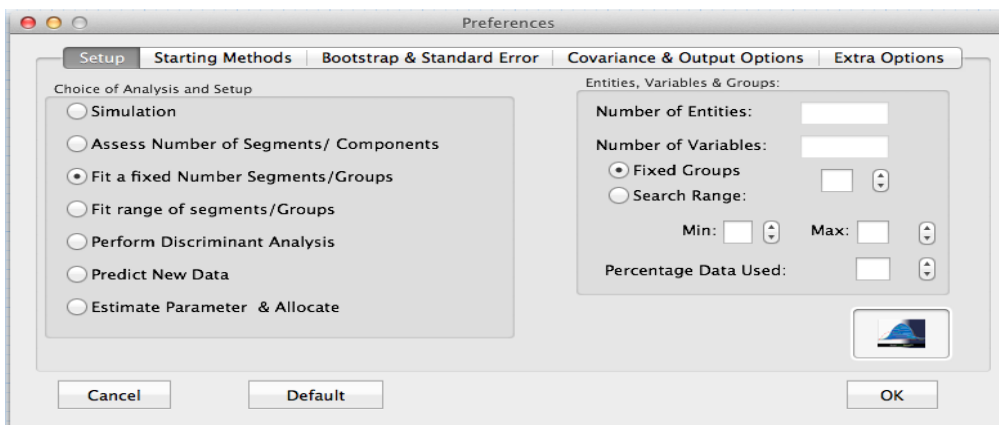

FIGURE 4.1 AroniSmartInvest interface. Advanced and Professional Version mode setup.

- The panel, shown in Figure 4.1 has five tabs:

- Tab1: **Setup:** that is where a main segmentation/ clustering/ discriminant analysis model is selected.

- Tab 2: **Starting Methods:** for setting initial options for analysis and segmentation.

- Tab 3: **Bootstrap and Standard error**: for setting bootstrap, error, and simulation parameters.

- Tab 4: **Covariance and Output Options**: for setting up covariance structure and output options.

- Tab 5: **Extra Options**: for advanced options to fine tune and optimize the model (not available in the individual client model)

Choosing the Main Analysis Model

The user must first choose the main analysis model from "**Setup**" tab. Several options are offered, but only one option can be selected and executed at a time.

For the individual version the available options shown in "Choice of Analysis and Setup" box are:

- ○ **Fit a fixed number of segments or groups**

- ○ **Fit a range of segments of groups**

By default the user is given the option to "**Fit a fixed number of segments or groups.** In the same tab, within the "**Entities, Variables & Groups**" box, the system automatically displays the number of entities and corresponding numeric variables used in the analysis. The user may also select the **Fixed or range of segments** to consider and the **percentage of data** used in the model.

The user has the option to use defaults values, which are:

- Number of segments: Fixed, 3 segments

- Percentage of data: 67%

Depending on the choice of analysis selected in this step, the path for further options selection varies. The following sections describe the available options for each analysis selection. Some choices may involve restrictions on the size of the data points (entities) and the variables.

The outputs are saved in local folders and may be used in further analyses, in plotting tools, or exported into other applications for further analysis.

Input Data and Data Presentation

The segmentation is based on a dataset either from the Stock SQLite3 database or as entered by the user. For most of the analysis options the input file mainly contains the complete data set to be analyzed. For others, additional datasets containing parameters may be required. In general, depending on which options are utilized when running the program, extra information may be required as input in the datasets or through the user interface

The dataset consists of sets experimental unit individuals stocks described by several variables. Individuals are represented in a standard way: a row from the database table. Hence, the data sets are represented by a matrix with *m* rows and *n* columns, the rows representing stocks or entities, and the columns representing variables.

Choosing an appropriate covariance structure is critical. The user may constrain the covariance matrices to be either equal for all components, arbitrary, or diagonal (equal or unequal). Generally unless the user has some prior knowledge of the covariance structure, arbitrary covariance should be used. This is the default option.

Covariance Structure   AroniSmartInvest is designed to handle some ill formed covariance structures. However, the user may try equal covariance in the case no solution can be found due to singular covariance matrices. Singularity is usually caused by any of the following situations:

1. Two or more of the variables are highly correlated

2. There are too many variables and not enough points

3. One of the variables is discrete and a cluster is being fitted to a single point of high density

Fit a Fixed number of segments or groups

Specified number of segments   Sometimes the investment analyst has a good idea on how many segments (g) to fit to the data. This option corresponds to this situation. The user must specify the known number of segments or components (g) in Setup tab, by selecting "Fixed Groups" button and selecting or entering the number of groups. This option is the default with g=3. For the default stock segmentation, the data set comes from the database. These options are selected in "**Starting Methods**" tab.

Fit a Range of Segments or groups

Specify a range of segments   In general, the investment analyst may not have a good idea on how many segments to fit to the data or just wants to test a range of segments. Selecting this option accomplishes the purpose.

The investment starts with a reasonable range with the assumption that the optimal number of the segments is within the range. Hence, the user must specify a range for the

number of segments from "**Setup**" tab by selecting "**Select Range"** radio button and setting the minimum and the maximum.

For this specified range, the program fits the segmentation model for each value of g, in turn, in the specified range. Finally, various test statistics are applied to evaluate the final statistics.

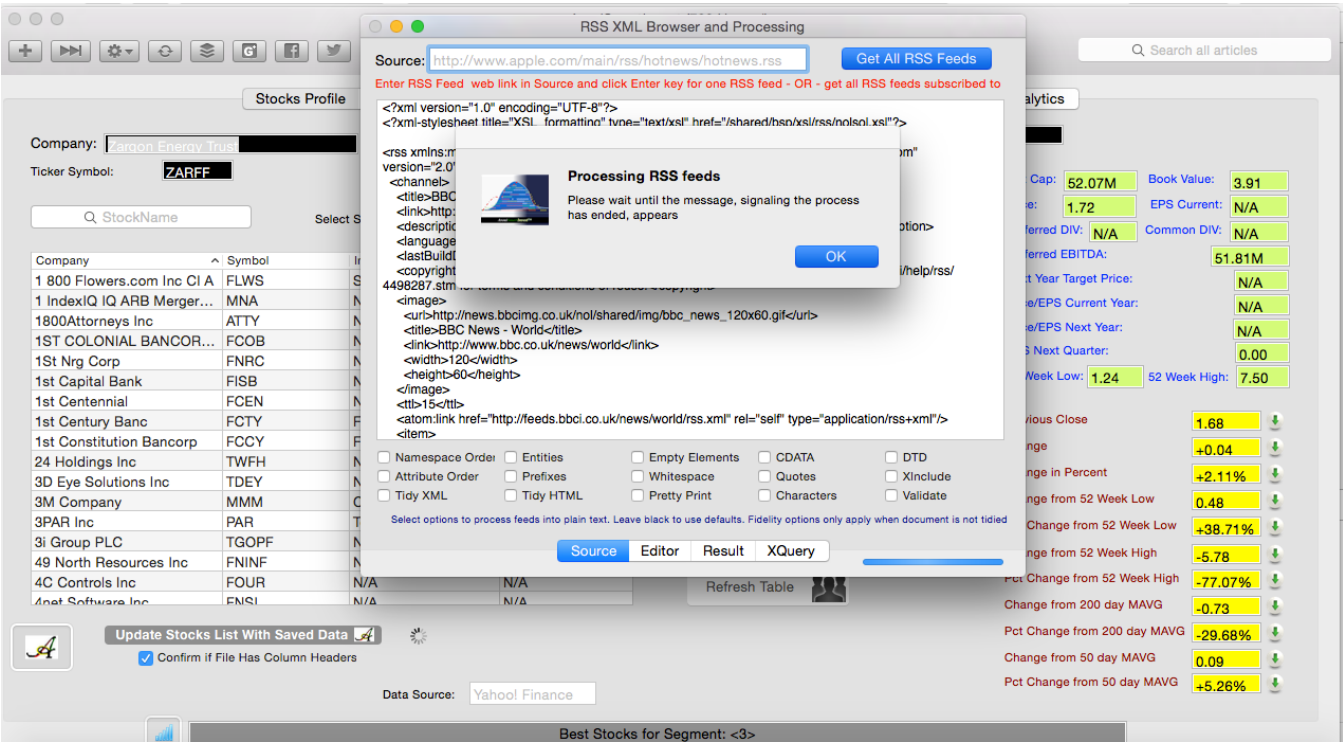## RSS and XMP Text Processing Panel in AroniSmartInvest

FIGURE 5.1.A AroniSmartInvest interface. RSS and XML Text Processing.

The panel, shown in Figure 5.1 is all that is needed to create folders and text files processed from RSS feeds.
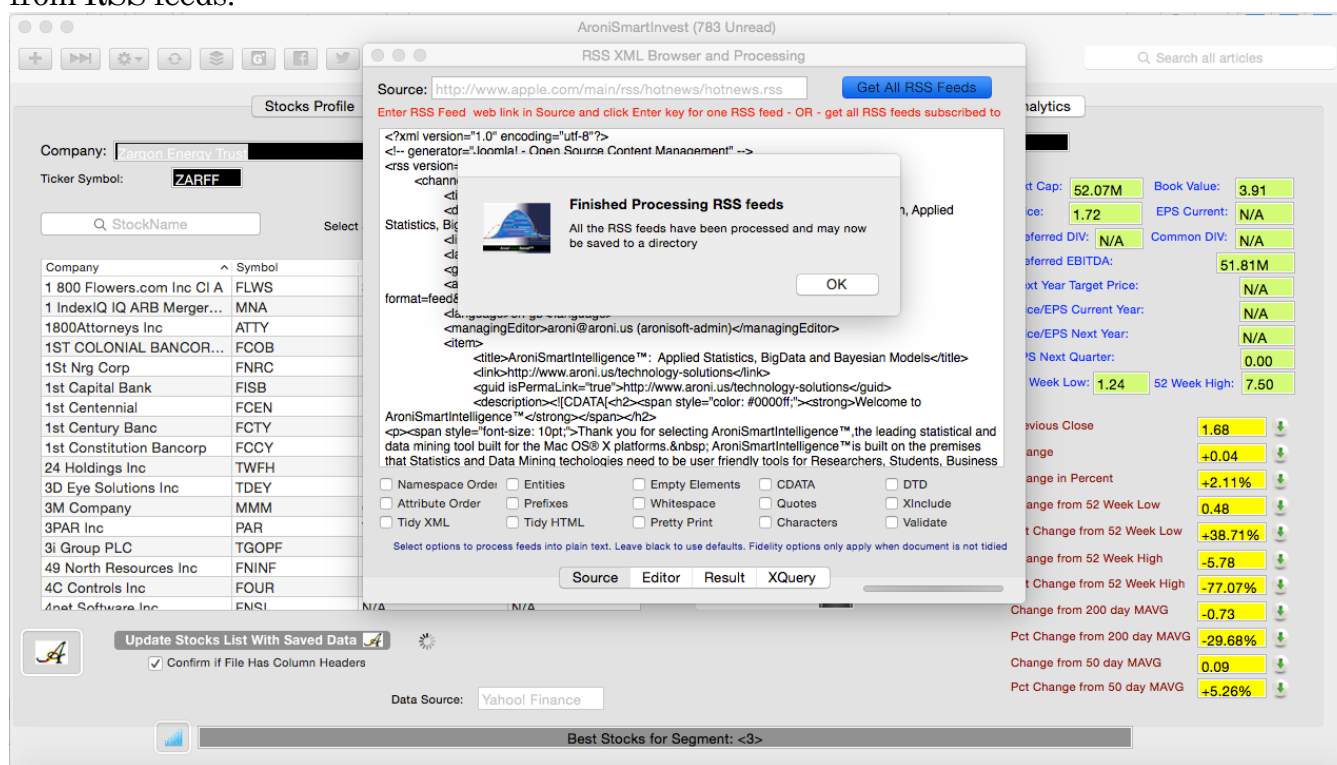
FIGURE 5.1.B AroniSmartInvest interface. RSS and XML Text Processing.

The panel has four tabs. For common users, only two tabs: Source and XQuery would be necessary:

- Tab1: **Source:** from the tab, it is possible to enter one RSS link for processing or to process all RSS feeds subscribed to. The content of the RSS feeds is displayed in the Source viewer and the processed plain text is shown in the viewer located in Tab 3, Result. From the Source tab, advanced users may also select the options for processing RSS feeds files in XML format

- Tab 2: **Editor:** for applying more advanced options.

- Tab 3: **Result**: for viewing the source code of RSS feeds

- Tab 4: **XQuery**: for viewing the processed text file and using XQuey commands, such as .\\title, .\\item, …, to view some components of RSS feeds

  Editor, **Result** and **XQuery** tabs can only be accessed after an RSS feed or all the feeds have been extracted.

Selecting RSS feeds

Note: Access to Internet is required to use the RSS and XML Text Processing and Browser.

If the RSS and XML browser is not displayed upon AroniSmartInvest™ successful launch, click on the AroniSmartInvest™ icon on the dock. The RSS and XML browser shows up.

Go to "**Source**" tab first.

Two choices are offered:

- Entering an RSS link and clicking "**Enter**" key to get, view and process the content from the link. The RSS link must be valid.

- Clicking "Get All RSS Feeds" button to extract the feeds from all RSS subscribed to. For this choice prior subscription to a number of RSS is required.

To apply specific options, the options at the bottom of the Source tab need to be selected prior to processing. Otherwise, default options will be applied.

Viewing the results from RSS feeds

The results from RSS processing come in two forms and are shown in two separate tabs:

- **Result tab**: the raw, unprocessed data from RSS feeds is displayed in the viewer.

- **XQuery tab:** processed plain, organized, and readable text is displayed in the viewer (see Figure 5.2). From XQuery tab, additional XQuery commands may be applied. Enter the command in the top browser, click "Apply XQuery Command" button (see Figure 5.3 and Figure 5.4).
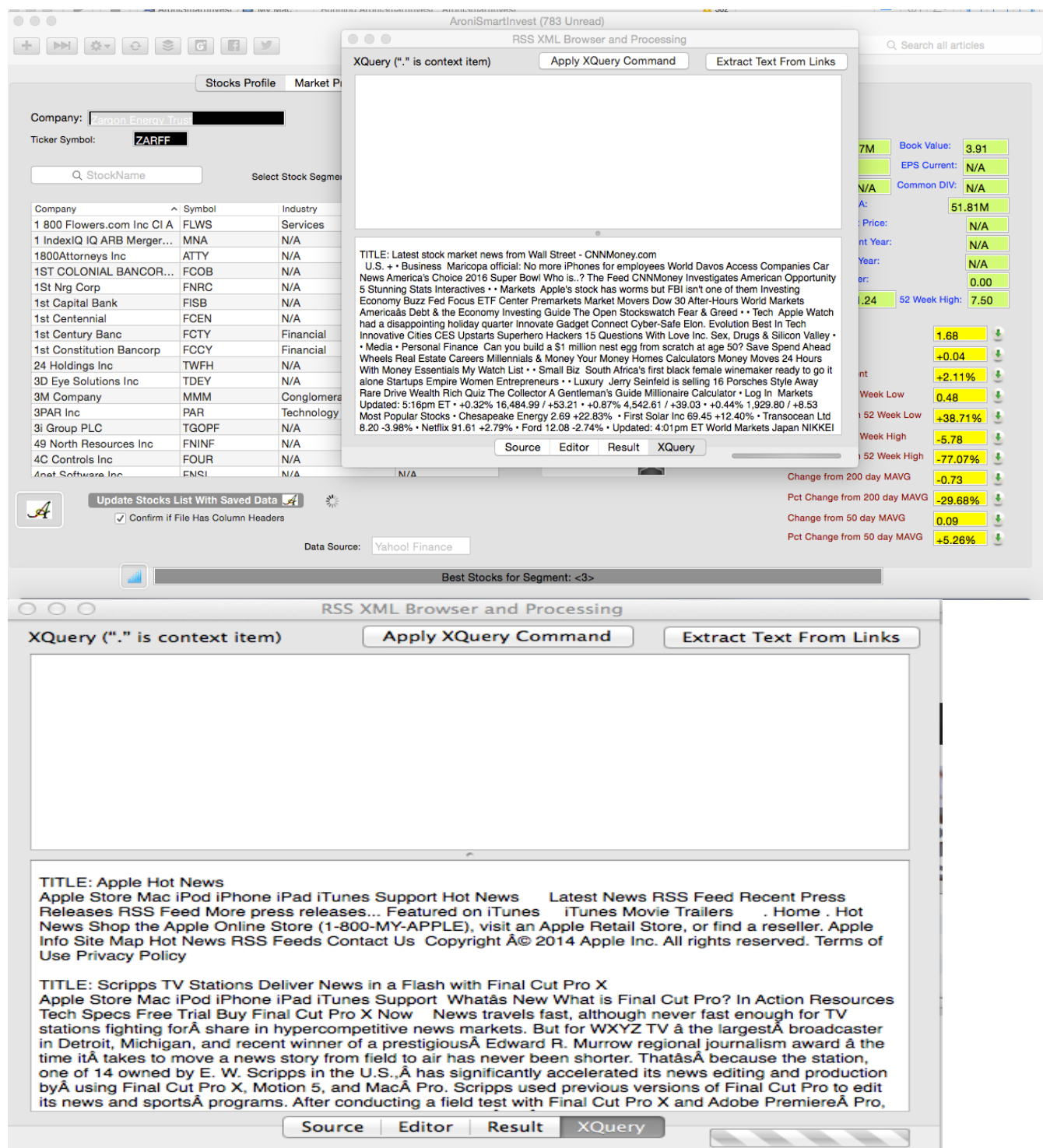
FIGURE 5.2 AroniSmartInvest interface. RSS and XML Text Processing. XQuery tab with processed plain and readable text
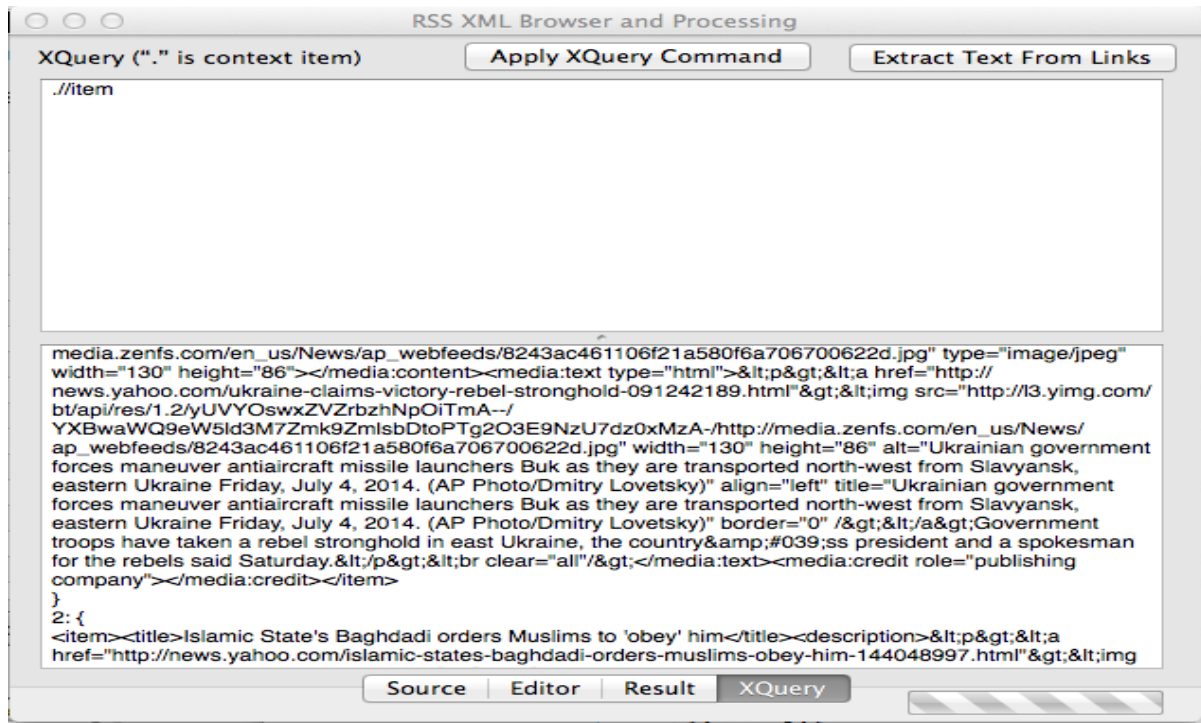
FIGURE 5.3 AroniSmartInvest interface. RSS and XML Text Processing. XQuery tab with XQuery command ".//item
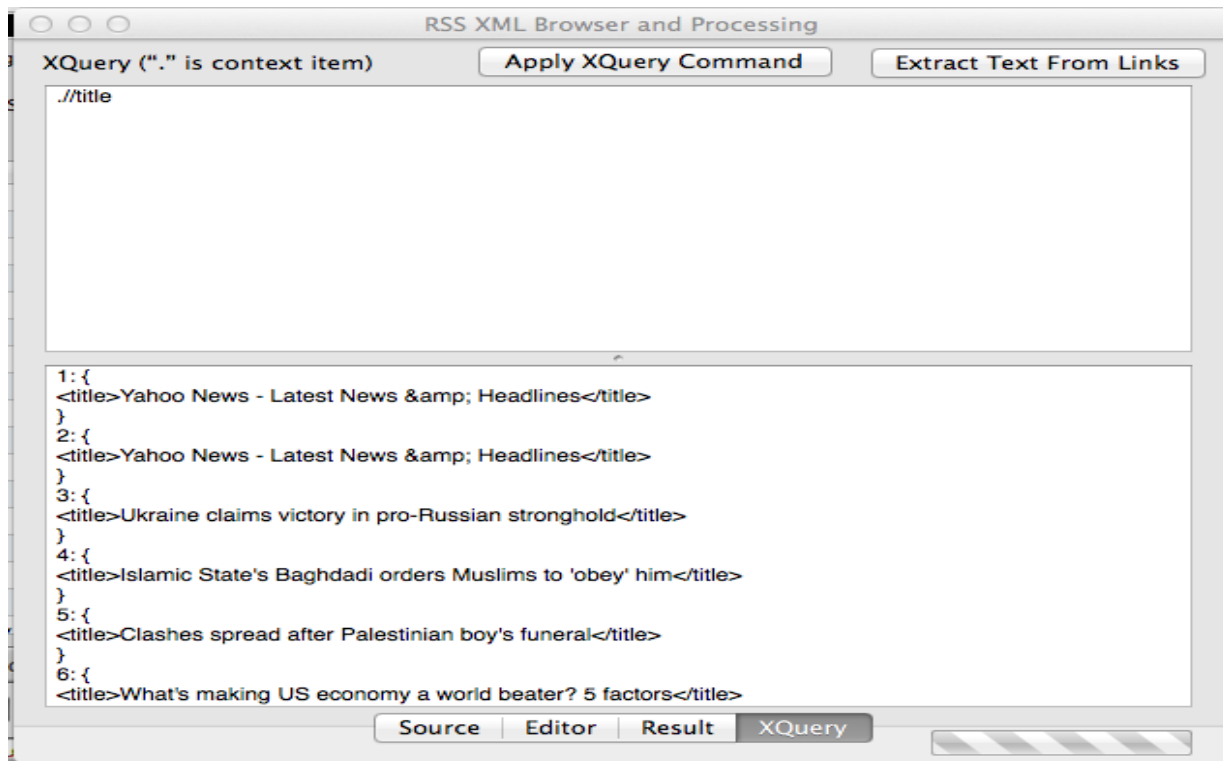

FIGURE 5.4 AroniSmartInvest interface. RSS and XML Text Processing. XQuery tab with XQuery command ".//title

Where are the results from RSS feeds text processing stored

Because AroniSmartInvest abides by the requirements for Application sandboxing, there are restrictions on where the processed text files must be stored. They are stored in the folder called "BigDataStore", stored on the following folder within the Home folder:

~/Library/Containers/us.aroni.AroniSmartInvest/Data/Documents/SharedCoreDataStores

There are two options to access the data.

Option 1, recommended

Normally the user should not directly manipulate files in the ~/Library/Containers. Hence, it is better to access and save the file through the RSS Text Analysis module.

Do the following: Click RSS Text Analysis tab, select "**Process Current News Feeds**", then click "**Process Current News Feeds**". Processed unstructured flat text files corresponding to articles are created and saved in subfolders in the application folders, usually not readily accessible by the user. Each RSS Entry has its own subfolder.

To save the feeds in the accessible user directory, click on "**Save Feeds"**. An Open panel displays and prompts the user to select a destination directory. Select an accessible directory, such as the user's home directory or "**Desktop"**. A directory named **"BigDataStore**" is created and saved in the selected destination directory. Within the **BigDataStore** directory are the subfolders corresponding to the RSS feeds, and in each sub-folder are the flat files.

Option 2, not recommended

To access the folder, do the following from Finder main menu:

Click Go, then Go To Folder and enter (with the ~) :
~/Library/Containers/us.aroni.AroniSmartInvest/Data/Documents/SharedCoreDataStores

The "BigDataStore" folder can be moved to another, more readily accessible location, for further analytical work, using AroniSmartIntelligence™ Text Processing, to prepare the files for Bayesian Network, Econometrics, and Regression modeling.

Note: wherever "BigDataStore" is moved to, BigDataStore is the folder to be selected, when prompted by AroniSmartIntelligence Text Processing module to select a directory for text processing. For more, see AroniSmartIntelligence™ manual

Chapter

6

Advanced Options in AroniSmartInvest for Enterprise

AroniSmartInvest™ is a powerful, yet intuitive segmentation tool. It is also flexible, allowing a variety of users from beginners to advanced analysts and to more sophisticated investors.   Investment analysts and investors may accomplish most of their requirements with the common options in the personal version.

Advanced analysts, with statistical expertise may want to fine-tune the model by setting up options available in the Professional version.

These options are grouped in the tabs only accessible with the professional version.

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