

WEKA & KNIME

Open Source Machine Learning Tools

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Agenda

- Introduction
- List of Open Source Machine Learning Tools
 - WEKA
 - KNIME
- Supported Formats by WEKA & KNIME
 - CSV
 - ARFF
- Techniques presented
- Data Sets Used
- Demonstration

Introduction

- Open source softwares becoming increasingly accepted.
- Variety of open source Machine Learning tools available
- Equally popular in both researchers and practitioners.
- Increasing demand for integrated environments to experiment and evaluate Machine Learning algorithms



- **Weka 3**, Data Mining Software in Java



- **KNIME**, Konstanz Information Miner (Java)

D2K - Data to Knowledge™



- **D2K**, Data to Knowledge (Java)



- **RapidMiner** (formerly **YALE**, Yet Another Learning Environment) (Java)



- **Orange**, a component-based data mining software (C++)



- **MLC++** is a library of C++ classes for supervised machine learning

WEKA: Main Features

- 49 data preprocessing tools
- 76 classification/regression algorithms
- 8 clustering algorithms
- 10 feature selection algorithms
- 3 algorithms for finding association rules
- 3 graphical user interfaces
 - “The Explorer” (exploratory data analysis)
 - “The Experimenter” (experimental environment)
 - “The KnowledgeFlow” (new process model inspired interface)

WEKA Purpose

- Used for research, education, and applications
- Main features:
 - Comprehensive set of data pre-processing tools, learning algorithms and evaluation methods
 - Graphical user interfaces (incl. data visualization)
 - Environment for comparing learning algorithms
- Can be used in two different ways:
 - User approach
 - Experimental & Explorer options
 - Developmental approach
 - Using compressed library source code

User Approach

- The explorer view allows options for:
 - Import Data
 - from files in various formats or from URL or an SQL database (using JDBC)
 - Pre-processing
 - tools in WEKA are called “filters”
 - Classification
 - Decision trees and lists, instance-based classifiers, support vector machines, multi-layer perceptrons, logistic regression, Bayes’ nets
 - Clustering
 - *k*-Means, EM, Cobweb, *X*-means, FarthestFirst
 - Associations
 - Contains a version of the Apriori algorithm, works only with discrete data

Preprocess

Classify

Cluster

Associate

Select attributes

Visualize

Open file...

Open URL...

Open DB...

Undo

Save...

Filter

Choose None

Apply

Current relation

Relation: None

Instances: None

Attributes: None

Selected attribute

Name: None

Missing: None

Distinct: None

Type: None

Unique: None

Attributes

Visualize All

Status

Welcome to the Weka Knowledge Explorer

Log



Preprocess

Classify

Cluster

Associate

Select attributes

Visualize

Classifier

Choose J48 -C 0.25 -M 2

Test options

 Use training set Supplied test set Set... Cross-validation Folds 10 Percentage split % 66

More options...

(Nom) class

Start

Stop

Result list (right-click for options)

11:49:05 - trees.j48.J48

View in main window

View in separate window

Save result buffer

Load model

Save model

Re-evaluate model on current test set

Visualize classifier errors

Visualize tree

Visualize margin curve

Visualize threshold curve

Visualize cost curve

Classifier output

Time taken to build model: 0.24 seconds

=== Evaluation on test split ===

=== Summary ===

Correctly Classified Instances	49	96.0784 %
Incorrectly Classified Instances	2	3.9216 %
Kappa statistic	0.9408	
Mean absolute error	0.0396	
Root mean squared error	0.1579	
Relative absolute error	8.8979 %	
Root relative squared error	33.4091 %	
Total Number of Instances	51	

=== Detailed Accuracy By Class ===

Recall	F-Measure	Class
1	1	Iris-setosa
1	0.95	Iris-versicolor
0.882	0.938	Iris-virginica

Status

OK

Log

x 0

Preprocess

Classify

Cluster

Associate

Select attributes

Visualize

Classifier

Choose

J48 - C 0.25 - M 2



Weka Classifier Tree Visualizer: 11:49:05 - trees.j48.J48 (iris)

Test options

- Use training set
- Supplied test set
- Cross-validation
- Percentage split

More options

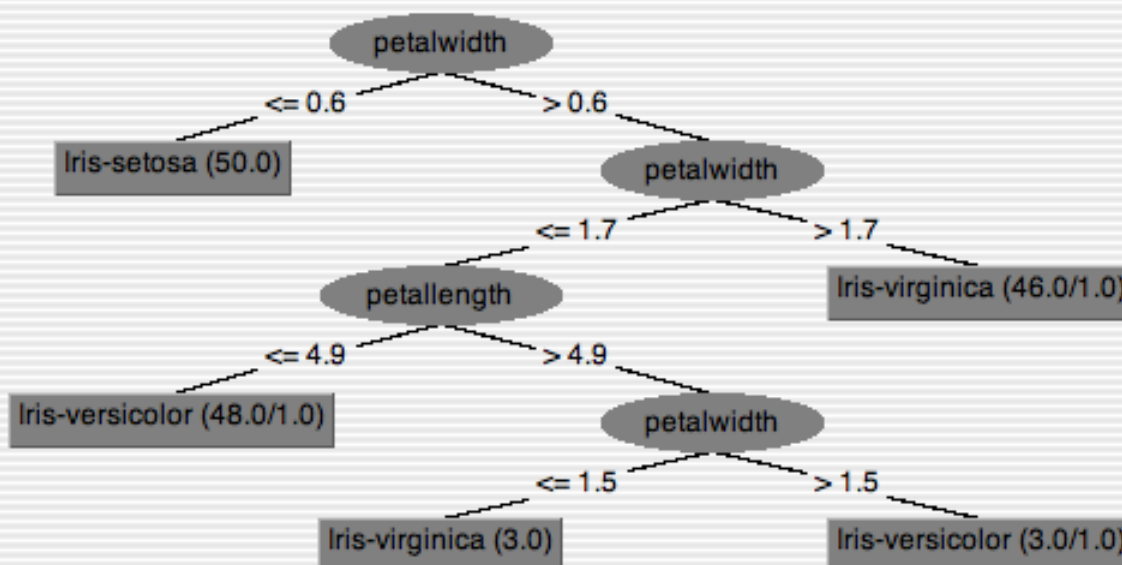
(Nom) class

Start

Result list (right-click for)

11:49:05 - trees.j48.J

Tree View



96.0784 %
3.9216 %

class
is-setosa
is-versicolor
is-virginica

```

10 0 0 | a = Iris-setosa
0 19 0 | b = Iris-versicolor
0 2 15 | c = Iris-virginica
  
```

Status

OK

Log



Supported File Formats

- CSV
- ARFF
- URL
- Database using jdbc connection

Flat file in .CSV format (Heart-Disease)

Age, sex, chest_pain_type, cholesterol, exercise_induced_angina, class

63,male,typ_angina,233,no,not_present

67,male,asympt,286,yes,present

67,male,asympt,229,yes,present

38,female,non_anginal,?,no,not_present

- WEKA only deals with flat files, e.g.,

```
@relation heart-disease
```

```
@attribute age numeric
```

```
@attribute sex { female, male}
```

```
@attribute chest_pain_type { typ_angina, asympt, non_anginal,  
    atyp_angina}
```

```
@attribute cholesterol numeric
```

```
@attribute exercise_induced_angina { no, yes}
```

```
@attribute class { present, not_present}
```

```
@data
```

```
63,male,typ_angina,233,no,not_present
```

```
67,male,asympt,286,yes,present
```

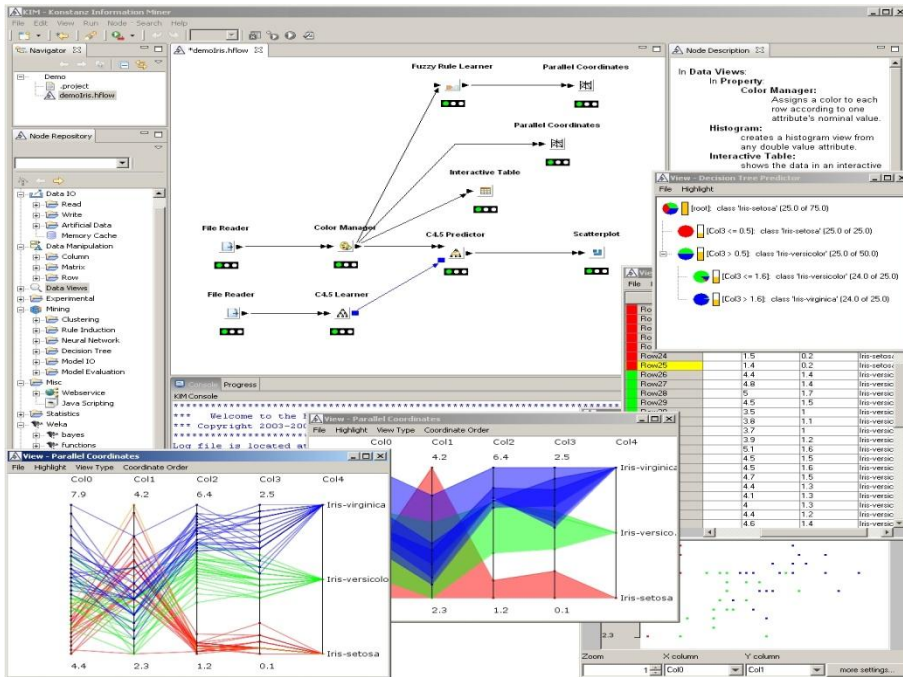
```
67,male,asympt,229,yes,present
```

```
38,female,non_anginal,?,no,not_present
```

KNIME: Interactive Data Exploration

Features:

- Modular Data Pipeline Environment
- Large collection of Data Mining techniques
- Data and Model Visualizations
- Interactive Views on Data and Models
- Java Code Base as Open Source Project
- Integration with: R Library, Weka, etc.
- Based on the Eclipse Plug-in technology



Easy extendibility

New nodes via open API and integrated wizard

Data Sets Used

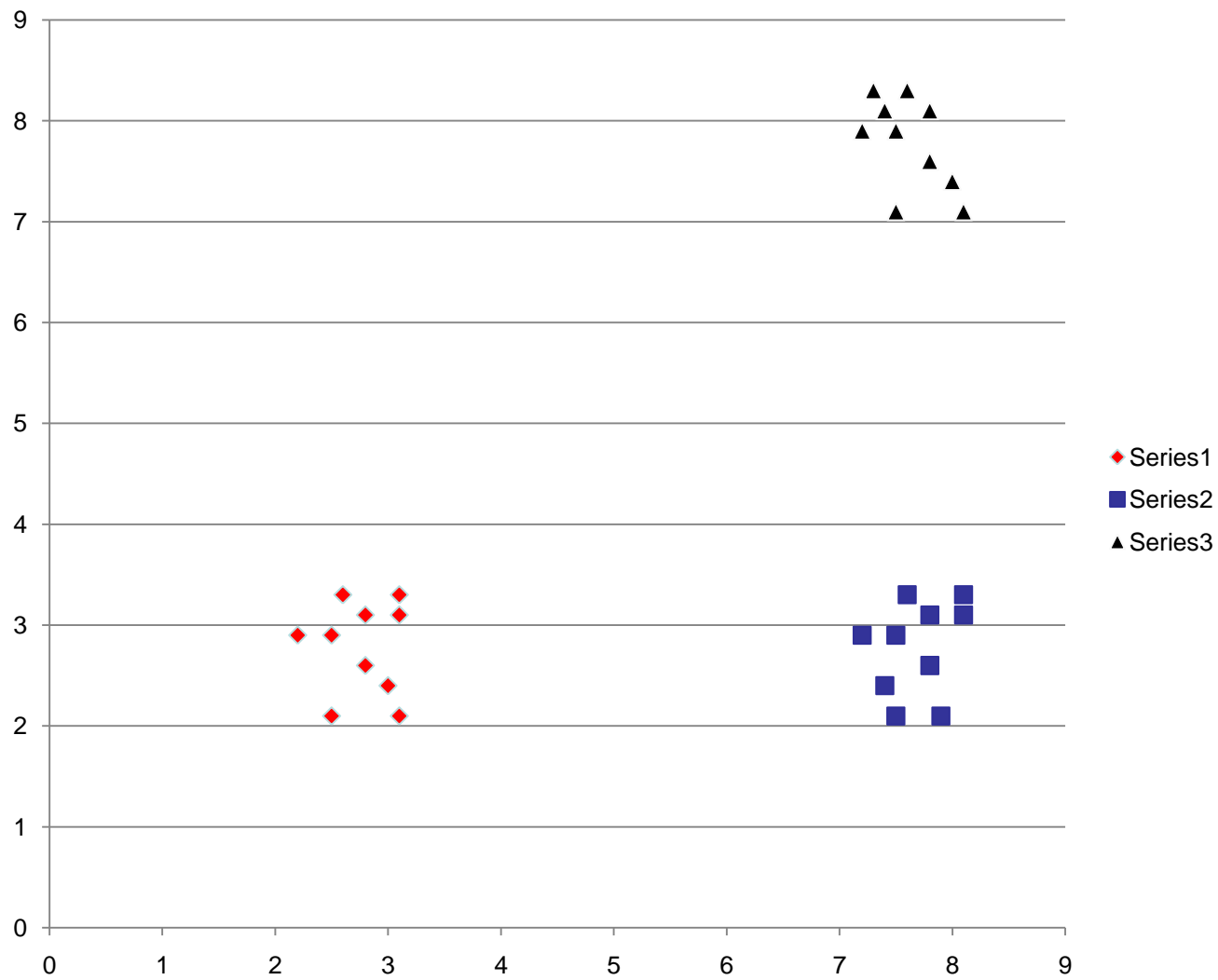
- **Manually Generated**
 - 2 features
 - 3 classes
 - 10 instances per class
- **Iris Data Set**
 - 4 features
 - 3 classes
 - 50 instances per class

Manually Generated

x	y	class
2.2	2.9	c1
3.1	2.1	c1
2.5	2.9	c1
2.6	3.3	c1
2.5	2.1	c1
2.8	2.6	c1
3	2.4	c1
3.1	3.1	c1
2.8	3.1	c1
3.1	3.3	c1

x	y	class
7.2	2.9	c2
7.9	2.1	c2
7.5	2.9	c2
7.6	3.3	c2
7.5	2.1	c2
7.8	2.6	c2
7.4	2.4	c2
8.1	3.1	c2
7.8	3.1	c2
8.1	3.3	c2

x	y	class
7.2	7.9	c3
8.1	7.1	c3
7.5	7.9	c3
7.6	8.3	c3
7.5	7.1	c3
7.8	7.6	c3
8	7.4	c3
7.4	8.1	c3
7.8	8.1	c3
7.3	8.3	c3



Sepal Length	Sepal Width	Petal Length	Petal Width	Class
5.1	3.5	1.4	0.2	Iris-setosa
4.9	3	1.4	0.2	Iris-setosa
4.7	3.2	1.3	0.2	Iris-setosa
4.6	3.1	1.5	0.2	Iris-setosa
5	3.6	1.4	0.2	Iris-setosa
5.4	3.9	1.7	0.4	Iris-setosa
4.6	3.4	1.4	0.3	Iris-setosa
5	3.4	1.5	0.2	Iris-setosa
4.4	2.9	1.4	0.2	Iris-setosa
4.9	3.1	1.5	0.1	Iris-setosa
5.4	3.7	1.5	0.2	Iris-setosa
4.8	3.4	1.6	0.2	Iris-setosa
4.8	3	1.4	0.1	Iris-setosa
4.3	3	1.1	0.1	Iris-setosa
5.8	4	1.2	0.2	Iris-setosa
5.7	4.4	1.5	0.4	Iris-setosa
5.4	3.9	1.3	0.4	Iris-setosa
5.1	3.5	1.4	0.3	Iris-setosa
5.7	3.8	1.7	0.3	Iris-setosa
5.1	3.8	1.5	0.3	Iris-setosa
5.4	3.4	1.7	0.2	Iris-setosa
5.1	3.7	1.5	0.4	Iris-setosa
4.6	3.6	1	0.2	Iris-setosa
5.1	3.3	1.7	0.5	Iris-setosa
4.8	3.4	1.9	0.2	Iris-setosa

Sepal Length	Sepal Width	Petal Length	Petal Width	Class
7	3.2	4.7	1.4	Iris-versicolor
6.4	3.2	4.5	1.5	Iris-versicolor
6.9	3.1	4.9	1.5	Iris-versicolor
5.5	2.3	4	1.3	Iris-versicolor
6.5	2.8	4.6	1.5	Iris-versicolor
5.7	2.8	4.5	1.3	Iris-versicolor
6.3	3.3	4.7	1.6	Iris-versicolor
4.9	2.4	3.3	1	Iris-versicolor
6.6	2.9	4.6	1.3	Iris-versicolor
5.2	2.7	3.9	1.4	Iris-versicolor
5	2	3.5	1	Iris-versicolor
5.9	3	4.2	1.5	Iris-versicolor
6	2.2	4	1	Iris-versicolor
6.1	2.9	4.7	1.4	Iris-versicolor
5.6	2.9	3.6	1.3	Iris-versicolor
6.7	3.1	4.4	1.4	Iris-versicolor
5.6	3	4.5	1.5	Iris-versicolor
5.8	2.7	4.1	1	Iris-versicolor
6.2	2.2	4.5	1.5	Iris-versicolor
5.6	2.5	3.9	1.1	Iris-versicolor
5.9	3.2	4.8	1.8	Iris-versicolor
6.1	2.8	4	1.3	Iris-versicolor
6.3	2.5	4.9	1.5	Iris-versicolor
6.1	2.8	4.7	1.2	Iris-versicolor
6.4	2.9	4.3	1.3	Iris-versicolor

Sepal Length	Sepal Width	Petal Length	Petal Width	Class
6.3	3.3	6	2.5	Iris-virginica
5.8	2.7	5.1	1.9	Iris-virginica
7.1	3	5.9	2.1	Iris-virginica
6.3	2.9	5.6	1.8	Iris-virginica
6.5	3	5.8	2.2	Iris-virginica
7.6	3	6.6	2.1	Iris-virginica
4.9	2.5	4.5	1.7	Iris-virginica
7.3	2.9	6.3	1.8	Iris-virginica
6.7	2.5	5.8	1.8	Iris-virginica
7.2	3.6	6.1	2.5	Iris-virginica
6.5	3.2	5.1	2	Iris-virginica
6.4	2.7	5.3	1.9	Iris-virginica
6.8	3	5.5	2.1	Iris-virginica
5.7	2.5	5	2	Iris-virginica
5.8	2.8	5.1	2.4	Iris-virginica
6.4	3.2	5.3	2.3	Iris-virginica
6.5	3	5.5	1.8	Iris-virginica
7.7	3.8	6.7	2.2	Iris-virginica
7.7	2.6	6.9	2.3	Iris-virginica
6	2.2	5	1.5	Iris-virginica
6.9	3.2	5.7	2.3	Iris-virginica
5.6	2.8	4.9	2	Iris-virginica
7.7	2.8	6.7	2	Iris-virginica
6.3	2.7	4.9	1.8	Iris-virginica
6.7	3.3	5.7	2.1	Iris-virginica

Algorithm Presented

- Decision trees
 - C4.5
- Clustering
 - K-Means
- Classification
 - Naïve Bays

References and Resources

- References:
 - WEKA website: <http://www.cs.waikato.ac.nz/~ml/weka/index.html>
 - WEKA Tutorial:
 - Machine Learning with WEKA: A [presentation](#) demonstrating all graphical user interfaces (GUI) in Weka.
 - A [presentation](#) which explains how to use Weka for exploratory data mining.
 - WEKA Data Mining Book:
 - Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition)
 - WEKA Wiki:
http://weka.sourceforge.net/wiki/index.php/Main_Page
 - Others:
 - Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, 2nd ed.

Demonstration

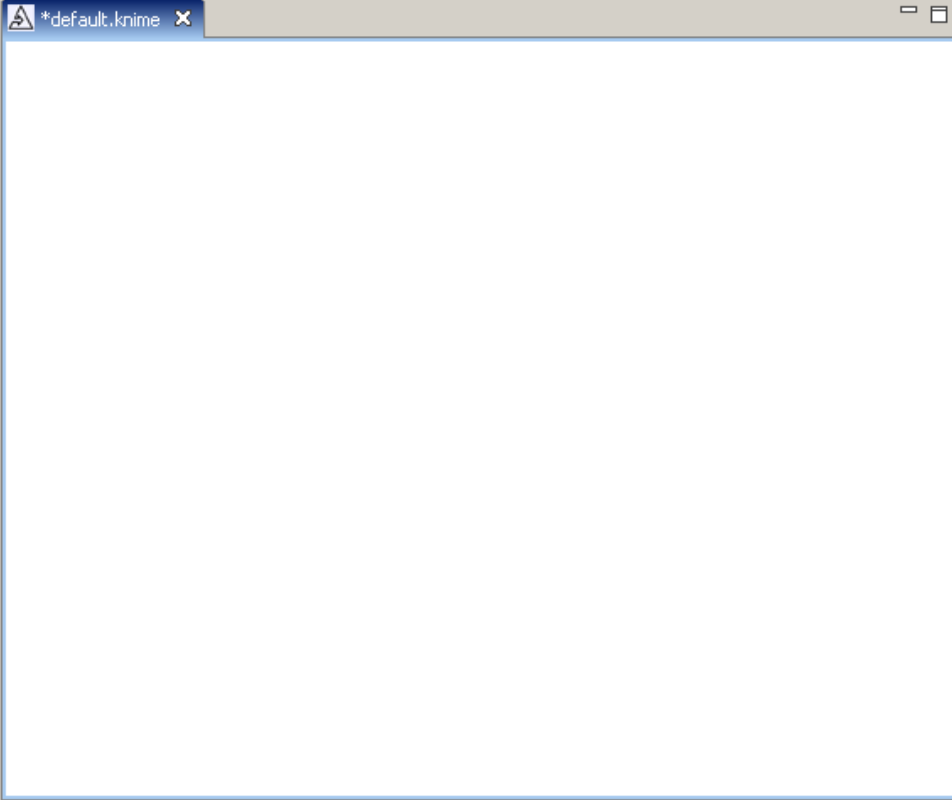
Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Chemistry
- Data IO
 - Read
 - ARFF Reader
 - Database Connector
 - File Reader
 - Write
 - Artificial Data
 - Memory Cache
- Data Manipulation
- Data Transformation
- Data Views
- Statistics
- Mining
- Misc
- Weka

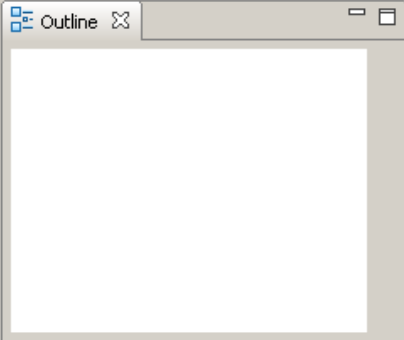
*default.knime



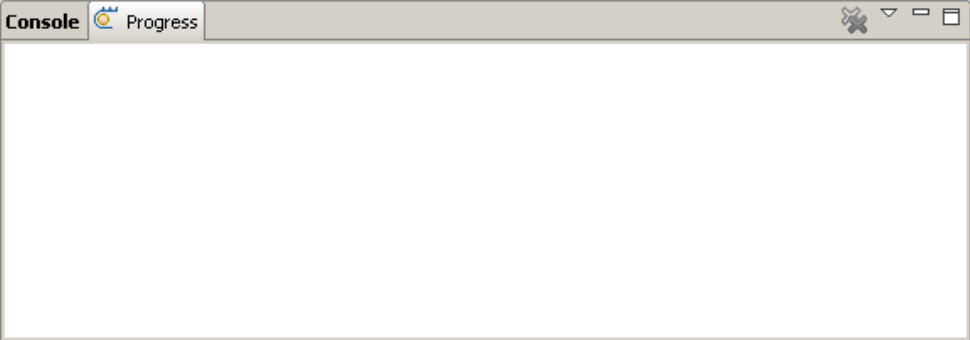
Node Description



Outline



Console Progress



Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Chemistry
- Data IO
 - Read
 - ARFF Reader
 - Database Connector
 - File Reader**
 - Write
 - Artificial Data
 - Memory Cache
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- Data Transformation
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- Statistics
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- Misc
- Weka

File Reader

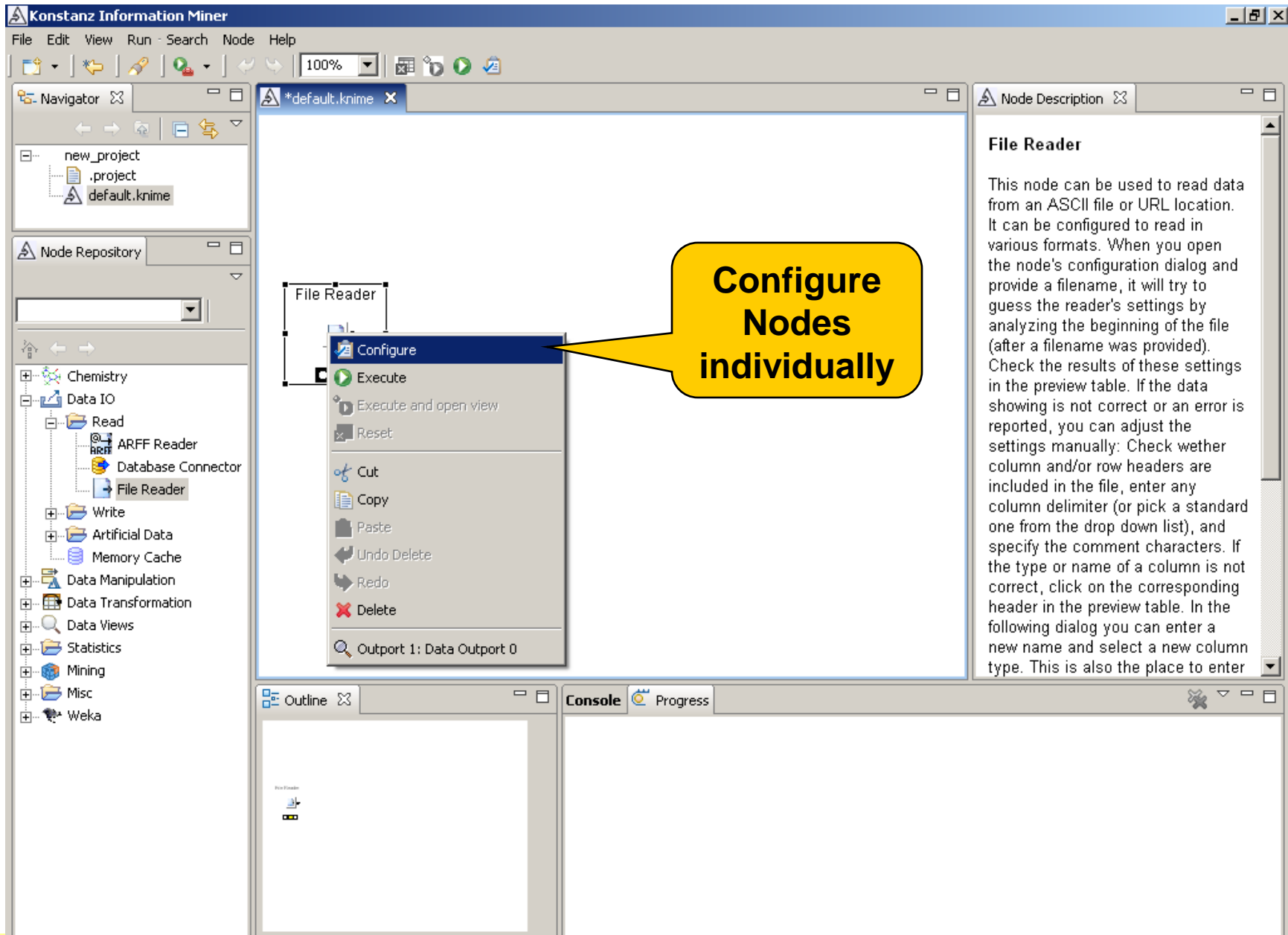
Drag & Drop Nodes from Repository to Workbench

Node Description

File Reader

This node can be used to read data from an ASCII file or URL location. It can be configured to read in various formats. When you open the node's configuration dialog and provide a filename, it will try to guess the reader's settings by analyzing the beginning of the file (after a filename was provided). Check the results of these settings in the preview table. If the data showing is not correct or an error is reported, you can adjust the settings manually: Check whether column and/or row headers are included in the file, enter any column delimiter (or pick a standard one from the drop down list), and specify the comment characters. If the type or name of a column is not correct, click on the corresponding header in the preview table. In the following dialog you can enter a new name and select a new column type. This is also the place to enter

Outline Console Progress



Konstanz Information Miner

File Edit View Run - Search Node Help

100%

Dialog - ASCII Data File Reader

File

Settings

Enter ASCII data file location: (press 'Enter' to update preview)

valid URL: file://C:/Dokumente und Einstellungen/berthold.INF/Desktop/KNIME_0.9

Basic Settings

read row headers Column delimiter: <space>

read column headers ignore spaces and tabs

Java-style comments Single line comment

Preview

Click column header to change column properties (* = name/type user setting)

Key	D Col0	D Col1	D Col2	D Col3	S Cl
Row1	5.1	3.5	1.4	0.2	Iris-setosa
Row2	4.9	3	1.4	0.2	Iris-setosa
Row3	4.7	3.2	1.3	0.2	Iris-setosa
Row4	4.6	3.1	1.5	0.2	Iris-setosa
Row5	5	3.6	1.4	0.2	Iris-setosa
Row6	5.4	3.9	1.7	0.4	Iris-setosa
Row7	4.6	3.4	1.4	0.3	Iris-setosa
Row8	5	3.4	1.5	0.2	Iris-setosa
Row9	4.4	2.9	1.4	0.2	Iris-setosa
Row10	4.9	3.1	1.5	0.1	Iris-setosa
Row11	5.4	3.7	1.5	0.2	Iris-setosa
Row12	4.8	3.4	1.6	0.2	Iris-setosa
Row13	4.8	3	1.4	0.1	Iris-setosa
Row14	4.3	3	1.1	0.1	Iris-setosa
Row15	5.8	4	1.2	0.2	Iris-setosa
Row16	5.7	4.4	1.5	0.4	Iris-setosa

New settings for column ...

Column Properties

Name: Class

Type: String

miss. value pattern: ?

Domain...

OK Cancel

OK Apply Cancel

Configure Nodes individually

File Reader

Chemistry

Data IO

Read

ARFF Reader

Database Connector

File Reader

Write

Artificial Data

Memory Cache

Data Manipulation

Data Transformation

Data Views

Statistics

Mining

Misc

Weka

Outline

used to read data
r URL location.

id

gs

is

prepare a standard
own list), and
nt characters. If
a column is not
e corresponding
w table. In the
can enter a
ct a new column
he place to enter

Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Chemistry
- Data IO
 - Read
 - ARFF Reader
 - Database Connector
 - File Reader
 - Write
- Artificial Data
- Memory Cache
- Data Manipulation
- Data Transformation
- Data Views
- Property
- JFreeChart
- Histogram
- Interactive Table
- Parallel Coordinates
- Rule2DPlotter
- Scatterplot

- Statistics
- Mining
- Misc
- Weka

*default.knime

Interactive Table

File Reader

Node Description

Outline

Console

Progress

Connect Nodes via Simple dragging

Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Chemistry
- Data IO
 - Read
 - ARFF Reader
 - Database Connector
 - File Reader
 - Write
- Artificial Data
- Memory Cache
- Data Manipulation
- Data Transformation
- Data Views
- Property
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- Rule2DPlotter
- Scatterplot

- Statistics
- Mining
- Misc
- Weka

*default.knime

Interactive Table

File Reader

Connect Nodes via Simple dragging

Node Description

Outline

Console Progress

Konstanz Information Miner

File Edit View Run Search Node Help

Navigator: new_project, .project, default.knime

Node Repository: Chemistry, Data IO, Read, ARFF Reader, Database Connect, File Reader, Write, Artificial Data, Memory Cache, Data Manipulation, Data Transformation, Data Views, Property, Colors, Size manager, JFreeChart, Histogram, Interactive Table, **Parallel Coordinates**, Rule2DPlotter, Scatterplot, Statistics, Mining, Clustering

*default.knime

Node Description: **Parallel Coordinates**

Numerical and nominal data will be shown in a parallel coordinate display where axes are decided as parallel, vertical lines and a point in this high dimensional space will be visualized as a line, connecting the attributes' values on each axes. (Fuzzy) Rules are represented as bands, connecting the corresponding intervals (the core regions in case of fuzzy rules).

Interactive Table

File Reader

Color Manager

Parallel Coordinates

Outline: File Reader, Color Manager, Interactive Table, Parallel Coordinates

Console

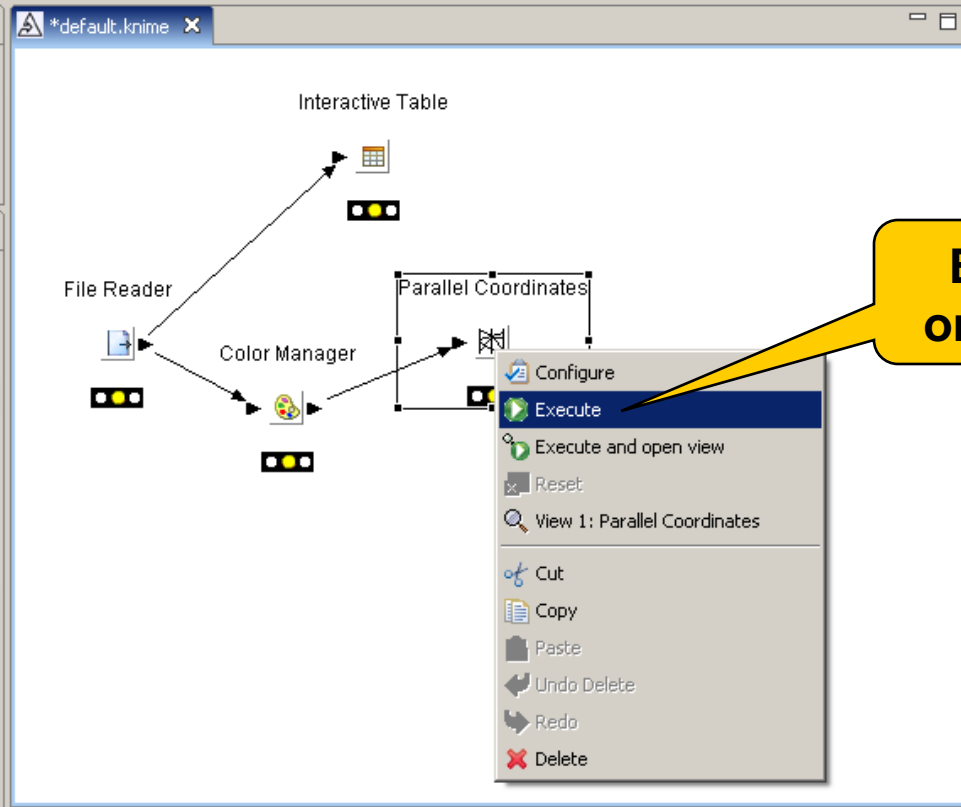
Progress

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Data Manipulation
- Data Transformation
- Data Views
 - Property
 - Colors
 - Size manager
- JFreeChart
 - Histogram
 - Interactive Table
 - Parallel Coordinates
 - Rule2DPlotter
 - Scatterplot
- Statistics
- Mining
 - Clustering
 - Rule Induction
 - Neural Network
 - Decision Tree
 - Decision Tree Prec
 - j48 Learner (Weka)
 - Model IO
 - Model Evaluation
 - Regression
 - SubgroupMining



Node Description

Parallel Coordinates

Numerical and nominal data will be shown in a parallel coordinate display where axes are decided as...

corresponding intervals (the core regions in case of fuzzy rules).

Execute one or more nodes

- Configure
- Execute**
- Execute and open view
- Reset
- View 1: Parallel Coordinates
- Cut
- Copy
- Paste
- Undo Delete
- Redo
- Delete

Outline

Console Progress

Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Data Manipulation
- Data Transformation
- Data Views
 - Property
 - Colors
 - Size manager
- JFreeChart
 - Histogram
 - Interactive Table
 - Parallel Coordinates
 - Rule2DPlotter
 - Scatterplot
- Statistics
- Mining
 - Clustering
 - Rule Induction
 - Neural Network
 - Decision Tree
 - Decision Tree Prec
 - j48 Learner (Weka)
- Model IO
- Model Evaluation
- Regression
- SubgroupMining

*default.knime

Node Description

Interactive Table

File Reader

Color Manager

Parallel Coordinates

Outline

Console

Progress

Konstanz Information Miner

File Edit View Run - Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Data Manipulation
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- Data Views
 - Property
 - Colors
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- JFreeChart
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 - Rule Induction
 - Neural Network
 - Decision Tree
 - Decision Tree Prec
 - j48 Learner (Weka)
 - Model IO
 - Model Evaluation
 - Regression
 - SubgroupMining

*default.knime

File Reader

Color Manager

Interactive Table

Parallel Coordinates

j48 (Weka)

C4.5 Predictor

View - Table (150 x 5)

File Highlight Navigation View Output

Key	D Col0	D Col1	D Col2	D Col3	S Class
Row1	5.1	3.5	1.4	0.2	Iris-setosa
Row2	4.9	3	1.4	0.2	Iris-setosa
Row3	4.7	3.2	1.3	0.2	Iris-setosa
Row4	4.6	3.1	1.5	0.2	Iris-setosa
Row5	5	3.6	1.4	0.2	Iris-setosa
Row6	5.4	3.9	1.7	0.4	Iris-setosa
Row7	4.6	3.4	1.4	0.3	Iris-setosa
Row8	5	3.4	1.5	0.2	Iris-setosa
Row9	4.4	2.9	1.4	0.2	Iris-setosa
Row10	4.9	3.1	1.5	0.1	Iris-setosa
Row11	5.4	3.7	1.5	0.2	Iris-setosa
Row12	4.8	3.4	1.6	0.2	Iris-setosa
Row13	4.8	3	1.4	0.1	Iris-setosa
Row14	4.3	3	1.1	0.1	Iris-setosa
Row15	5.8	4	1.2	0.2	Iris-setosa
Row16	5.7	4.4	1.5	0.4	Iris-setosa

Outline

Console

Progress

Open individual views per node

Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Data Manipulation
- Data Transformation
- Data Views
 - Property
 - Colors
 - Size manager
- JFreeChart
 - Histogram
 - Interactive Table
 - Parallel Coordinates
 - Rule2DPlotter
 - Scatterplot
- Statistics
- Mining
 - Clustering
 - Rule Induction
 - Neural Network
 - Decision Tree
 - Decision Tree Prec
 - j48 Learner (Weka)
 - Model IO
 - Model Evaluation
 - Regression
 - SubgroupMining

***default.knime**

Interactive Table

File Reader → **Color Manager** → **Parallel Coordinates**

Color Manager → **J48 (Weka)** → **C4.5 Predictor**

View - Table (150 x 5)

Key	D Col0	D Col1	D Col2	D Col3	S Class
Row1	5.1	3.5	1.4	0.2	Iris-setosa
Row2	4.9	3	1.4	0.2	Iris-setosa
Row3	4.7	3.2	1.3	0.2	Iris-setosa
Row4	4.6	3.1	1.5	0.2	Iris-setosa
Row5	5	3.6	1.4	0.2	Iris-setosa
Row6	5.4	3.9	1.7	0.4	Iris-setosa
Row7	4.6	3.4	1.4	0.3	Iris-setosa
Row8	5	3.4	1.5	0.2	Iris-setosa
Row9	4.4	2.9	1.4	0.2	Iris-setosa
Row10	4.9	3.1	1.5	0.1	Iris-setosa
Row11	5.4	3.7	1.5	0.2	Iris-setosa
Row12	4.8	3.4	1.6	0.2	Iris-setosa
Row13	4.8	3	1.4	0.1	Iris-setosa
Row14	4.3	3	1.1	0.1	Iris-setosa
Row15	5.8	4	1.2	0.2	Iris-setosa
Row16	5.7	4.4	1.5	0.4	Iris-setosa

View - Parallel Coordinates

Coordinate	Col0	Col1	Col2	Col3	Class
7.9	4.4	6.9	2.5	Iris-virginica	
4.3	2.0	1.0	0.1	Iris-versicolor	
				Iris-setosa	

Outline

Conso

Konstanz Information Miner

File Edit View Run Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

- Data Manipulation
- Data Transformation
- Data Views
- Property
- Colors

View - Table (150 x 5)

Key	D Col0	D Col1	D Col2	D Col3	S Class
Row1	5.1	3.5	1.4	0.2	Iris-setosa
Row2	4.9	3	1.4	0.2	Iris-setosa
Row3	4.7	3.2	1.3	0.2	Iris-setosa
Row4	4.6	3.1	1.5	0.2	Iris-setosa
Row5	5	3.6	1.4	0.2	Iris-setosa
Row6	5.4	3.9	1.7	0.4	Iris-setosa
Row7	4.6	3.4	1.4	0.3	Iris-setosa
Row8	5	3.4	1.5	0.2	Iris-setosa
Row9	4.4	2.9	1.4	0.2	Iris-setosa
Row10	4.9	3.1	1.5	0.1	Iris-setosa
Row11	5.4	3.7	1.5	0.2	Iris-setosa
Row12	4.8	3.4	1.6	0.2	Iris-setosa
Row13	4.8	3	1.4	0.1	Iris-setosa
Row14	4.3	3	1.1	0.1	Iris-setosa
Row15	5.8	4	1.2	0.2	Iris-setosa
Row16	5.7	4.4	1.5	0.4	Iris-setosa

View - Decision Tree J48

Tree

- Highlight Selected Branch
- Unhighlight Selected Branch
- Clear Highlight

- [<= 4.9]: class 'Iris-versicolor' (49.0 of 54.0)
- []: class 'Iris-versicolor' (47.0 of 48.0)
- [<= 1.5]: class 'Iris-virginica' (4.0 of 6.0)
- []: class 'Iris-virginica' (45.0 of 46.0)

View - Parallel Coordinates

Coordinate	Col0	Col1	Col2	Col3	Class
7.9	4.3	2.0	1.0	0.1	Iris-virginica
4.4	4.3	2.0	1.0	0.1	Iris-versicolor
6.9	4.3	2.0	1.0	0.1	Iris-setosa
2.5	4.3	2.0	1.0	0.1	Iris-setosa

Conso

J48 (Weka)

C4.5 Predictor

Interactive Table

Parallel Coordinates

Mark (hilit) selected points

Konstanz Information Miner

File Edit View Run Search Node Help

100%

new_project
 .project
 default.knime

Node Repository

Data Manipulation
 Data Transformation
 Data Views
 Property
 Colors

View - Table (150 x 5)

Key	D Col0	D Col1	D Col2	D Col3	S Class
Row73	6.3	2.5	4.9	1.5	Iris-versicolor
Row74	6.1	2.8	4.7	1.2	Iris-versicolor
Row75	6.4	2.9	4.3	1.3	Iris-versicolor
Row76	6.6	3	4.4	1.4	Iris-versicolor
Row77	6.8	2.8	4.8	1.4	Iris-versicolor
Row78	6.7	3	5	1.7	Iris-versicolor
Row79	6	2.9	4.5	1.5	Iris-versicolor
Row80	5.7	2.6	3.5	1	Iris-versicolor
Row81	5.5	2.4	3.8	1.1	Iris-versicolor
Row82	5.5	2.4	3.7	1	Iris-versicolor
Row83	5.8	2.7	3.9	1.2	Iris-versicolor
Row84	6	2.7	5.1	1.6	Iris-versicolor
Row85	5.4	3	4.5	1.5	Iris-versicolor
Row86	6	3.4	4.5	1.6	Iris-versicolor
Row87	6.7	3.1	4.7	1.5	Iris-versicolor
Row88	6.3	2.3	4.4	1.3	Iris-versicolor

Interactive Table

Coordi

J48 (Weka) C4.5 Predictor

View - Decision Tree J48

File Highlight

Treeview Weka Tree Summary Source

- [<= 1.7]: class 'Iris-versicolor' (50.0 of 100.0)
- [<= 4.9]: class 'Iris-versicolor' (49.0 of 54.0)
- []: class 'Iris-versicolor' (47.0 of 48.0)
- [<= 1.5]: class 'Iris-virginica' (4.0 of 6.0)
- []: class 'Iris-virginica' (45.0 of 46.0)

Model IO
 Model Evaluation
 Regression
 SubgroupMining

Conso

View - Parallel Coordinates

File Highlight View Type Coordinate Order

All Visible
 Hide Unhighlighted
 Fade Unhighlighted

Col2 Col3 Class

6.9 2.5

Iris-virginica
 Iris-versicolor
 Iris-setosa

4.3 2.0 1.0 0.1

HiLiting also spreads to other views

Konstanz Information Miner

File Edit View Run - Search Node Help

100%

Navigator

- new_project
 - .project
 - default.knime

Node Repository

Memory Cache

View - Histogram on 'Molecular Weig...

File Highlight Zoom

View - Table (337 x 2)

File Highlight Navigation View Output

Key	Structure
13	<chem>NC1=CC=C(C=C1)N</chem>
14	<chem>ClC1=CC=C(C=C1)N</chem>
15	<chem>ClC1=CC=C(C=C1)OC1=CC=C(C=C1)Cl</chem>

View - Scatterplot of ta

File Highlight

Interactive Table

Molecular Properties

Size Manager

Color Manager

Node Repository

Property

- Colors
- Size manager
- JFreeChart
- Histogram
- Interactive Table
- Parallel Coordinates

Color Manager

Size Manager

Color Filter

Scatterplot

Many more views and also other types available...

Multiple values of
to an
evenly
's view
a bar for
the bar
number of
filling into the
view
highlighting -
nt color
portional to
h the
at...