Using Classification Algorithms to Improve the Interaction Between Teachers and Students

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Project Goal

My dissertation diploma project was entitled Using Classification Algorithms in Order to Improve the Interaction between Students and Professors. This project started from the need of having a decision tree classifier that can accommodate data. Creating this enhanced data structure would allow a wide range of methods to be applied on that tree and would bring new research opportunities. Apart from this, several useful functionalities are implemented (i.e. outliers and extreme values detection, predecessors and successors computation, etc).

Classification of items (i.e. students, genes, etc.) on data sources provided by various software systems represents an important task that needs to be performed for many reasons related to the business goals of the system. “Building an advanced dense classifier” [1] presents several approaches that need to be taken into consideration by a data analysis system designer who aims to obtain an advanced classifier that implements several extra functionalities.

In “Integrating an Advanced Classifier in WEKA” are covered some of the missing features that may be useful to researchers and developers when working with decision tree classifiers. The rest of the paper presents the design of an official package compatible with the WEKA Package Manager. The functionalities provided by the tool include instance loading, successor/predecessor computation and an alternative visualization feature of an enhanced decision tree, using the J48 algorithm.

```
<current directory>
  +-AdvancedClassifier.jar
  +-Description.props
  +-build_package.xml
  +-src
  |  +-main
  |    +-java
  |      +-resources
  |      |  +-background_node.png
  |      |  +-background_leaf.png
  |      |  +-background_leaf_pressed.png
  |      |  +-font_node.ttf
  |      |  +-font_decision.ttf
  |      +-weka
  |         +-classifiers
  |         |  +-trees
  |         |    +-model
  |         |    |  +-AdvancedClassifierTree.java
  |         |    |  +-AdvancedClassifierTreeBaseNode.java
  |         |    |  +-AdvancedClassifierTreeNode.java
  |         |    |  +-AdvancedClassifierTreeLeaf.java
  |         |    |  +-BaseAttributeValidator.java
  |         |    |  +-NominalAttributeValidator.java
  |         |    |  +-NumericAttributeValidator.java
  |         |    |  +-Constants.java
  |         |    +-AdvancedClassifier.java
  |         |    +-WekaTextfileToXMLTextfile.java
  |         +-gui
  |            +-visualize
  |               +-plugins
  |                  +-AdvancedClassifierTree.java
  |                  +-AdvancedClassifierTreePanel.java
  |                  +-BaseNodeView.java
  |                  +-AdvancedClassifierTreeNodeView.java
  |                  +-AdvancedClassifierTreeLeafView.java
  |                  +-ConnectingLineView.java
  +-lib
    +-weka.jar
    +-simple-xml.jar
    +-rt.jar
```

"J48 List Ranker based on Advanced Classifier Decision Tree Induction" presents a general purpose ranking algorithm called J48ListRanker based on a decision tree induction which exhibits extra functionality for accommodating instances and providing an efficient way to access them in a classification general setup. This computational need arises from the lack of a generic way of accessing classified instances in a ranked order. In general, classifiers are implemented only as data models and have little capability in handling and working with whole set of instances or specific instances. A preliminary study of this augmented classifier is on educational data where instances are represented by users (i.e. learners) and an initial task is to obtain a ranked list of students according with their label/class established by the classifier

Involved Tools and Technologies

Weka	For the implementation of the J48 algorithm.
SAX and DOM parser	For XML usage
Eclipse IDE	IDE for developing an application based on Java language programming.
Java	Programming language used for developing the tool

1. **Paul-Stefan Popescu**, Marian Cristian Mihaescu, Mihai Mocanu, Dumitru Dan Burdescu , *Building an Advanced Dense Classifier*, Proceedings of the IISA2014 5-th International Conference on Information, Intelligence, Systems and Applications July 07 – 09, 2014, Chania Crete, Greece
   *** ***Best Paper Award***
2. Official package:
   http://weka.sourceforge.net/packageMetaData/RankerByDTClassification/index.html