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Document history

| Version | Date | Author (Unit) | Description |
|---------|------|---------------|----------------------|
| v0.3 | | | First draft finished |

Executive summary

The aim of this document is to track the development process of the AMIDST toolbox.

The document is structured into sections, such that each section includes the required details for a specific use case, i.e., a general description of the purpose of the use case as well as a categorised list of its associated requirements.

We then associate to each use case a list of so-called *functionalities* (included in independent subsections) that are coded in the toolbox to cover the specific use case and their associated requirements. A *functionality*, or also called a *feature*, is a set of java classes that allows to perform a specific task or that defines a coherent concept within the toolbox. For example, the creation and management of random variables, reading a data set from a file, building and handling dynamic Bayesian networks, the maximum likelihood estimation, etc. The set of *functionalities* identify those key parts of the toolbox that any developer or toolbox user need to understand in order to make a proper use of the AMIDST toolbox.

Another important part of this document is to detail the time line of the toolbox development. Each of the use cases contain an additional subsection named *Time tables* which contain details about the development phase of each *functionality* associated to this use case. Six main phases are identified: design, prototype, code-review, testing, documentation and (first) release. Through this section, we can easily track the evolution of the use case.

In the last section, we detail the class diagram of each package in the AMIDST toolbox.

Finally, the document is concluded with an appendix which contains a pdf document generated by the toolbox Doxygen and which contains all the java docs of all the coded java classes.

We highlight that the contents detailed here can be later modified or re-organized to create the different deliverables and the final user-manual of the AMIDST toolbox.

Temporal organization of all the use cases

| Use case ID | Deadline | Start Date | End Date | Status | Priority |
|-------------|----------|------------|----------|--------|----------|
| DB | M15 | M10 | - | - | Must |
| BS | M15 | M6 | - | - | Must |
| HL | M15 | M11 | - | - | Must |
| VMP | M15 | - | - | - | Must |
| IS | M16 | - | - | - | Must |
| DMAP | M17 | - | - | - | Must |
| PPC | M17 | - | - | - | Must |
| ML | M18 | M12 | - | - | Must |
| EP | M18 | - | - | - | Must |
| TAN | M18 | - | - | - | Must |
| FS | M20 | - | - | - | Must |
| VMAP | M28 | - | - | - | Should |
| DC | M29 | - | - | - | Could |

1 Use Case - Data bases (DB)

Priority: Must

Deadline: M15

Responsible: Sigve

Description of the use case

This use case will cover the managing of the data bases that will be used by the models and learning algorithms implemented in the toolbox.

Must-Requirements list of the use case

1. Data on memory
2. Data on disk

Should-Requirements list of the use case

1. Data on stream

Could-Requirements list of the use case

1. Short Description

1.1 Attributes

Deadline: M12

Responsible: Sigve

Code-Package: core.databases

Description

Attributes serve as an intermediary to build the Static or Dynamic Variables from the dataset that are parsed from the dataset and/or specified by the user (precisely by a class that extends this class).

Detailed functionality

- List of objects of the type Attribute. This list becomes Unmodifiable after construction.
- There can be two special attributes, namely "TIME_ID" AND "SEQUENCE_ID". The former refers to a temporal identifier whereas the second identifies a particular sequence (e.g. a client in CajaMar or a drill in Verdande). They only exist if they explicitly appear in the dataset with that particular names.

1.2 Data file reader

Deadline: M12

Responsible: Sigve

Code-Package: core.database.filereaders

Description

It refers to the different parsers.

Detailed functionality

Right now we have the following readers:

1. Weka wrapper reader: fully working and tested.
2. AMIDST arff reader.

1.3 Data instance

Deadline: M12

Responsible: Sigve

Code-Package: core.database

Description

DataInstance is an interface that can be implemented by a StaticDataInstance and a DynamicDataInstance. The former stores one row (DataRow) of the dataset at a time, whereas the second contains two rows of the dataset.

Detailed functionality

A DynamicDataInstance always has a TimeID and a SequenceID. If this two attributes, or any of the two, are not in the dataset then they are automatically filled in, incrementally for the TimeID and with a value of 1 for the SequenceID.

- StaticDataInstance: contains one DataRow
- DynamicDataInstance: contains a past and a present DataRow, a TimeID and a SequenceID. The TimeID attribute in the dataset can be used to represent missing samples (stored as DataRowMissing), in which all attribute values are NaN.

1.4 Scalable DataInstance management

Deadline: M12

Responsible: Sigve

Code-Package: core.database

Description

It is used to manage the output of the reader (DataRows) and convert them into DataInstances. We need to distinguish between static and dynamic and whether the data can be load into memory or read from disk.

Detailed functionality

- Static:

- Data on memory
- Data on disk
- Data on stream.

- Dynamic:

- Data on memory
- Data on disk
- Data on stream.

1.5 Time tables

Attributes

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|---------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Andres,Sigve | M15 | M10 | M10 |
| 0.2 | Prototype | Ana, Sigve | M15 | M10 | M10 |
| 0.3 | Code Review | Ana | M15 | M11 | M10 |
| 0.4 | Testing | Ana | M15 | M11 | M11 |
| 0.5 | Java-Doc | Sigve | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

Data file reader

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|----------------------------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Ana,Andres | M15 | M10 | M11 |
| 0.2 | 1st Prototype (AMIDSTarffParser) | Sigve | M15 | M10 | Unfinished |
| 0.2 | Prototype (WekaArffParser) | Ana | M15 | M11 | M11 |
| 0.2 | Testing (WekaArffParser) | Ana | M15 | M11 | M11 |
| 0.3 | Code Review | Post-docs | M15 | | |
| 0.4 | Testing | Sigve | M15 | | |
| 0.5 | Java-Doc | Sigve | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

Data instance

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|-------------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Ana,Andres | M15 | M11 | M11 |
| 0.2 | Prototype | Ana | M15 | M11 | M11 |
| 0.2 | Prototype testing | Ana | M15 | M11 | M11 |
| 0.3 | Code Review | Sigve | M15 | | |
| 0.4 | Testing | Sigve | M15 | | |
| 0.5 | Java-Doc | Sigve | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

Scalable DataInstance management

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|------------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Ana,Andres | M15 | M11 | M11 |
| 0.2 | Prototype | Ana | M15 | M11 | M11 |
| 0.2 | Prototye Testing | Ana | M15 | M11 | M11 |
| 0.3 | Code Review | Sigve | M15 | | |
| 0.4 | Testing | Sigve | M15 | | |
| 0.5 | Java-Doc | Sigve | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

2 Use Case - Basic data structures (BS)

Priority: Must

Deadline: M15

Responsible:

Description of the use case

This use case will cover the basic data structures to handle the probabilistic graphical models belonging to the AMIDST model class, and to be included in the toolbox (a tentative list is given below).

On the other hand, information about possible models to be plug-in into the toolbox beyond the project is also desirable to be indicated.

Must-Requirements list of the use case

1. Static Bayesian network (BN)
2. Two-time slice dynamic Bayesian network (2T-DBN)
3. Bounded dynamic Bayesian network

Should-Requirements list of the use case

1. Additional operations for learning Bayesian networks

Could-Requirements list of the use case

1. Factor graphs

2.1 Static variables

Deadline: M12

Responsible:

Code-Package: eu.amidst.core.variables

Description

Static variables define the list of static variables to be used in the static BN models.

Detailed functionality

- List of objects of the type Variable.
- A static variable is characterised by its name, ID, the number of states, the state space type, the distribution type, as well as if it is observable or not.
- The state space type could be either Multinomial or Real.
- The distribution type could be either Multinomial or Gaussian.
- The list of observable static variables is initialised using the list of Attributes (that are already parsed from the dataset or specified by the user), then hidden variables can be also added.

2.2 Dynamic variables

Deadline: M12

Responsible:

Code-Package: eu.amidst.core.variables

Description

Dynamic variables define the list of dynamic variables to be used in the dynamic BN models.

Detailed functionality

- List of objects named allVariables and temporalClones of the type Variable.
- A dynamic variable is characterised by its name, ID, the number of states, the state space type, the distribution type, if it is observable or not, and if it is temporal clone or not.
- The state space type could be either Multinomial or Real.
- The distribution type could be either Multinomial or Gaussian.
- The list of observable dynamic variables and their temporal clones is initialised using the list of Attributes (that are already parsed from the dataset or specified by the user), then hidden variables and their temporal clones can be also added.

2.3 Directed acyclic graph (DAG)

Deadline: M12

Responsible:

Code-Package: eu.amidst.core.models

Description

The class Directed acyclic graph (DAG) defines the Bayesian network graphical structure over a list of static variables.

Detailed functionality

- It defines the parent set for each variable.
- It test and detect if a DAG contains cycles or not.

2.4 Distributions

Deadline: M15

Responsible: Antonio Fernández

Code-Package: eu.amidst.core.distributions

Description

This functionality addresses the set of conditional probability distributions considered to be included in the toolbox. Variables with Gaussian and multinomial distributions are modeled. The variables arrangement in the model structure gives rise to the different types of probability distributions, one for each variable in the network.

This functionality is tightly connected to functionality **Variable** and **DAG** to know both the type and the set of parents of each variable.

Detailed functionality

The type and the set of parents of each variable determine the different defined probability distributions as follows:

- Multinomial variable with no parents
-

- Multinomial variable with multinomial parents.
- Gaussian variable with no parents.
- Gaussian variable with multinomial parents.
- Gaussian variable with Gaussian parents.
- Gaussian variable with a mixture of multinomial and Gaussian parents.

Note that a multinomial variable is not allowed to have Gaussian parents and therefore it has not been included in the list above.

Multinomial parents are only used for indexing the set of possible distributions of the variable, so the functionality when no multinomial parents reduces to the general case.

2.5 Bayesian network

Deadline: M12

Responsible:

Code-Package: eu.amidst.core.models

Description

This class defines a static Bayesian network using the already specified graphical structure (DAG) along with the conditional probability distribution of each variable given the set of its parents.

Detailed functionality

- The distribution of each variable in the Bayesian network is initialised and specified according to its type and the type of its potential parent set.
- After this step, the set of parents of each variable becomes unmodifiable.

2.6 Dynamic DAG

Deadline: M12

Responsible:

Code-Package: eu.amidst.core.models

Description

It defines the dynamic Bayesian network graphical structure over a list of dynamic variables by specifying their parent sets at time 0 and time T.

Detailed functionality

- It defines the parent set at time 0 and time T for each dynamic variable.
- It test and detect if a dynamic DAG contains cycles or not.

2.7 2T-DBN

Deadline: M12

Responsible:

Code-Package: core.models

Description

This functionality is similar to the one defined for Bayesian network (see 2.5), but it aims here to represent instead a two slice-time dynamic Bayesian network (2T-DBN). It handles its structure (dynamic DAG defined over a set of dynamic variables) and the set of its distributions at time 0 and time T.

Detailed functionality

- The distributions of each dynamic variable at both time 0 and time T are initialised and specified according to the variable type and the type of its potentiel parent set.
- After this step, the set of parents of each dynamic variable becomes unmodifiable.

2.8 Time tables

Static variables

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|---------|---------------|----------------------|----------|------------|----------|
| 0.1 | Design | Ana, Andres, Antonio | M11 | M6 | M11 |
| 0.2 | Prototype | Andres, Hanen | M11 | M11 | M11 |
| 0.3 | Code Review | Ana | M11 | M11 | M11 |
| 0.4 | Testing | Ana, Antonio, Hanen | M11 | M11 | M11 |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

Dynamic variables

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|---------|---------------|----------------------|----------|------------|----------|
| 0.1 | Design | Ana, Andres, Antonio | M11 | M6 | M11 |
| 0.2 | Prototype | Ana | M11 | M11 | M11 |
| 0.3 | Code Review | Andres | M11 | M11 | M11 |
| 0.4 | Testing | Ana | M11 | M11 | M11 |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

DAG

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|---------|---------------|----------------------|----------|------------|----------|
| 0.1 | Design | Andres, Hanen | M11 | M6 | M11 |
| 0.2 | Prototype | Hanen | M11 | M11 | M11 |
| 0.3 | Code Review | Ana, Andres, Antonio | M11 | M11 | M11 |
| 0.4 | Testing | Hanen | M11 | M11 | M11 |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

Distributions

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|---------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Andres, Antonio | M11 | M6 | M11 |
| 0.2 | Prototype | Antonio | M11 | M11 | M11 |
| 0.3 | Code Review | Ana, Andres | M11 | M11 | M11 |
| 0.4 | Testing | Antonio | M11 | M11 | M11 |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

Bayesian network

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|---------------|------------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Andres, Antonio, Hanen | M11 | M6 | M11 |
| 0.2 | Prototype | Hanen | M11 | M11 | M11 |
| 0.3 | Code Review | Ana, Andres, Antonio | M11 | M11 | M11 |
| 0.4 | Testing | Post-docs | M11 | | |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

Dynamic DAG

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|---------------|------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Ana, Andres, | M12 | M11 | M11 |
| 0.2 | Prototype | Ana, Andres | M12 | M11 | M11 |
| 0.3 | Code Review | Post-docs | M12 | | |
| 0.4 | Testing | Post-docs | M12 | | |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

2T-DBN

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|----------------|---------------|----------------------|-----------------|-------------------|-----------------|
| 0.1 | Design | Ana, Andres, Antonio | M12 | M6 | M11 |
| 0.2 | Prototype | Ana, Antonio | M12 | M11 | M11 |
| 0.3 | Code Review | Andres | M12 | M11 | |
| 0.4 | Testing | Post-docs | M12 | | |
| 0.5 | Java-Doc | Post-docs | | | |
| 0.6 | First Release | Post-docs | M15 | | |

3 Use Case - Hugin link (HL)

Priority: Must

Deadline: M15

Responsible: A. Fernández

Description of the use case

This use case contains all the functionality needed to link the AMIDST toolbox with the HUGIN software. This linkage is addressed by converting Hugin models into AMIDST models, and vice versa. This feature is extremely useful as it allows expanding the testing possibilities of the AMIDST models within a well-established platform as Hugin. Also, the link to Hugin can be used for providing some extra functionality to AMIDST that will not be implemented. Finally, the linkage is useful for comparison purposes, i.e., a new inference algorithm implemented in AMIDST could be compared with some state-of-the-art algorithm included in Hugin.

Must-Requirements list of the use case

1. Bayesian network converter from AMIDST to Hugin format.
2. Bayesian network converter from Hugin to AMIDST format.
3. Possibility of saving the converted Hugin network in a .net file.

Should-Requirements list of the use case

- 1.

Could-Requirements list of the use case

1. Converter from AMIDST to HUGIN and vice versa of some functionality that is not relevant for model representation.

3.1 Bayesian networks converter

Deadline: M12

Responsible: A. Fernández

Code-Package: core.huginlink

Description

This functionality addresses the conversion of a static Bayesian network model from AMIDST to HUGIN and vice-versa. This conversion is done at “object-level”, which is far more efficient than if done by converting the models to data files and, then, parsing them.

Detailed functionality

- Short Description

3.2 Time tables

Bayesian networks converter

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|---------|---------------|-------------|----------|------------|----------|
| 0.1 | Design | Antonio | M12 | M11 | M11 |
| 0.2 | Prototype | Antonio | M12 | M11 | M11 |
| 0.3 | Code Review | Andres, Ana | M12 | M11 | M11 |
| 0.4 | Testing | Post-docs | M12 | M11 | M11 |
| 0.5 | Java-Doc | Post-docs | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

4 Use Case - Maximum likelihood (ML)

Priority: Must

Deadline: M12

Responsible:

Description of the use case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements list of the use case

1. Short Description

Should-Requirements list of the use case

1. Short Description

Could-Requirements list of the use case

1. Short Description

4.1 Exponential family distributions

Deadline: M12

Responsible: Andres

Code-Package: core.exponentialfamily

Description

This functionality addresses the representation of the probability distributions in an exponential family form. I.e. they are encoded by a vector of natural and moment parameters. Functionality for computing the sufficient statistics for a data instance is also provided. These set of classes are going to be used across several use cases: ML, VMP, EP, VMAP, etc.

Detailed functionality

The type of each variable and its parents determine the different exponential family distributions detailed next:

- Multinomial variable with no parents
- Multinomial variable with multinomial parents.
- Gaussian variable with no parents.
- Gaussian variable with multinomial parents.
- Gaussian variable with Gaussian parents.
- Gaussian variable with multinomial and Gaussian parents.

4.2 Time tables

Exponential family

| Version | Phase | Author(s) | Deadline | Start Date | End Date |
|---------|---------------|-----------|----------|------------|----------|
| 0.1 | Design | Andres | M12 | M11 | M11 |
| 0.2 | Prototype | Andres | M12 | M11 | |
| 0.3 | Code Review | Post-docs | M12 | | |
| 0.4 | Testing | Post-docs | M12 | | |
| 0.5 | Java-Doc | Post-docs | M15 | | |
| 0.6 | First Release | Post-docs | M15 | | |

5 Use Case - Importance sampling (IS)

Priority: Must

Deadline: M16

Responsible:

Description of the use case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements list of the use case

1. Short Description

Should-Requirements list of the use case

1. Short Description

Could-Requirements list of the use case

1. Short Description

6 Use Case - Variational Message Passing (VMP)

Priority: Must

Deadline: M15

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

7 Use Case - Expectation Propagation (EP)

Priority: Must

Deadline: M18

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

8 Use Case - MAP with Deterministic Approximations (DMAP)

Priority: Must

Deadline: M17

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

9 Use Case - Variational MAP Inference (VMAP)

Priority: Should

Deadline: M28

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

10 Use Case - TAN Classifier (TAN)

Priority: Must

Deadline: M18

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

11 Use Case - Parallel PC (PPC)

Priority: Must

Deadline: M17

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

12 Use Case - Dynamic classifiers (DC)

Priority: Could

Deadline: M29

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

1. Short Description

Could-Requirements List of the Use Case

1. Short Description

13 Use Case - Feature Selection (FS)

Priority: Must

Deadline: M20

Responsible:

Description of the Use Case

Enter a textual description of the use case. Link to other use cases or functionalities if needed.

Must-Requirements List of the Use Case

1. Short Description

Should-Requirements List of the Use Case

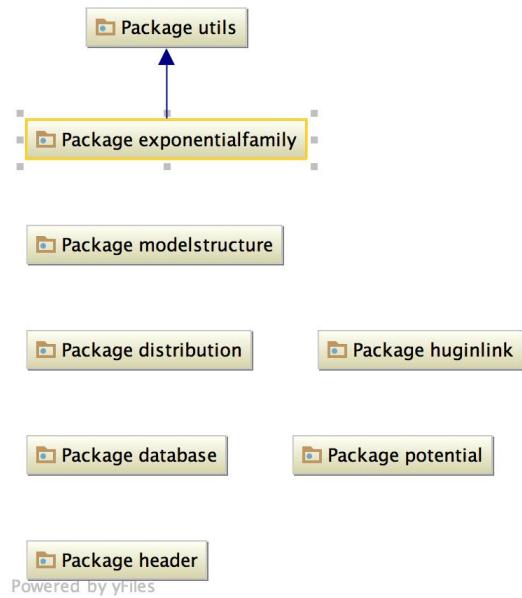
1. Short Description

Could-Requirements List of the Use Case

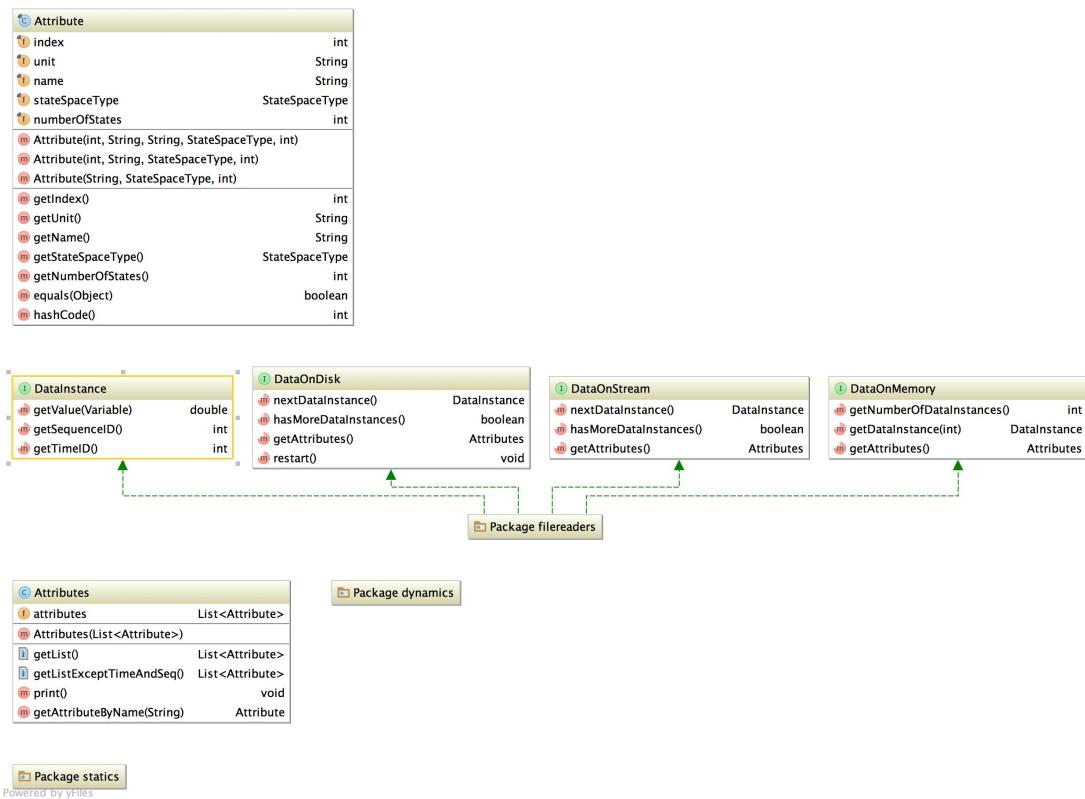
1. Short Description

Class diagrams

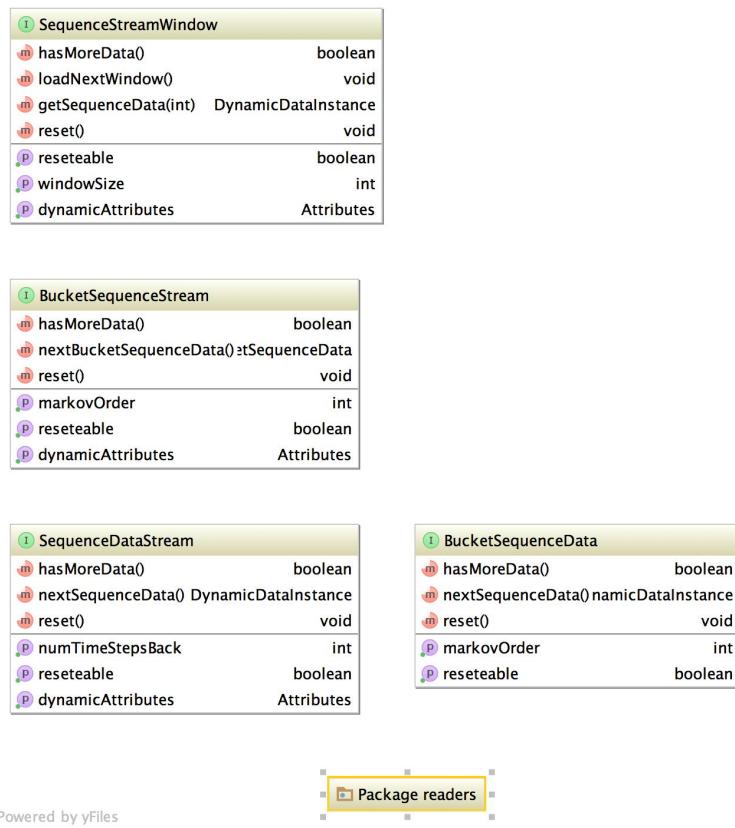
13.1 Package core



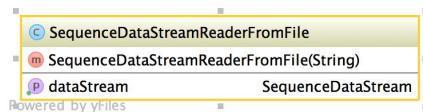
13.2 Package core.database



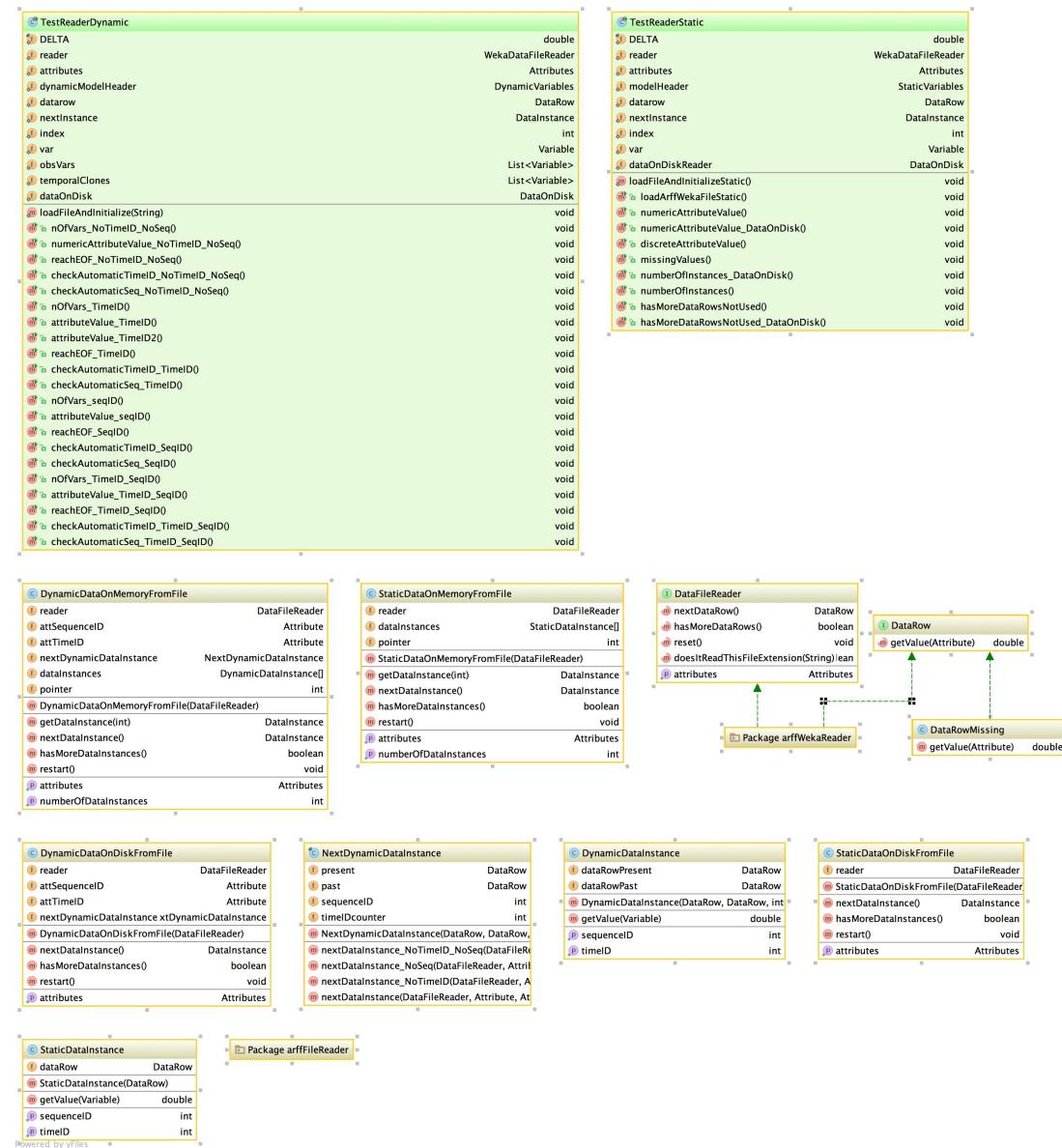
13.3 Package core.database.dynamics



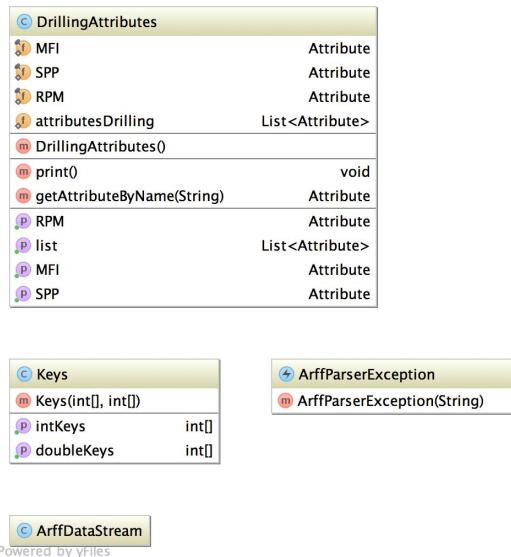
13.4 Package core.database.readers



13.5 Package core.database.filereaders



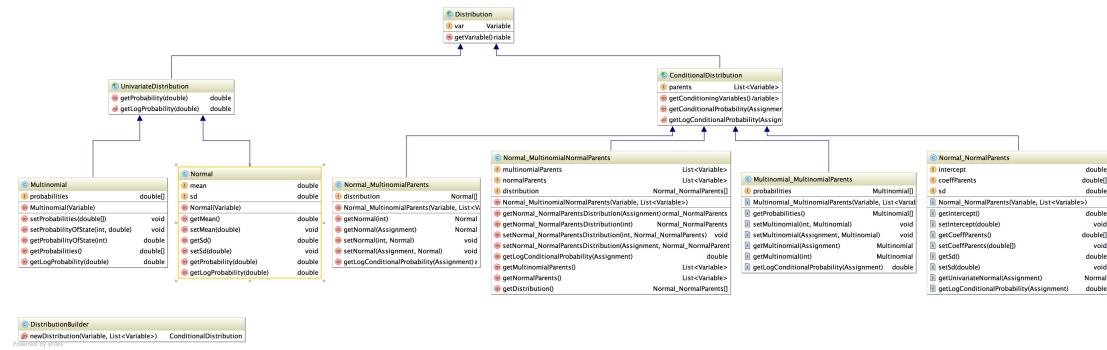
13.6 Package core.database.arffFileReader



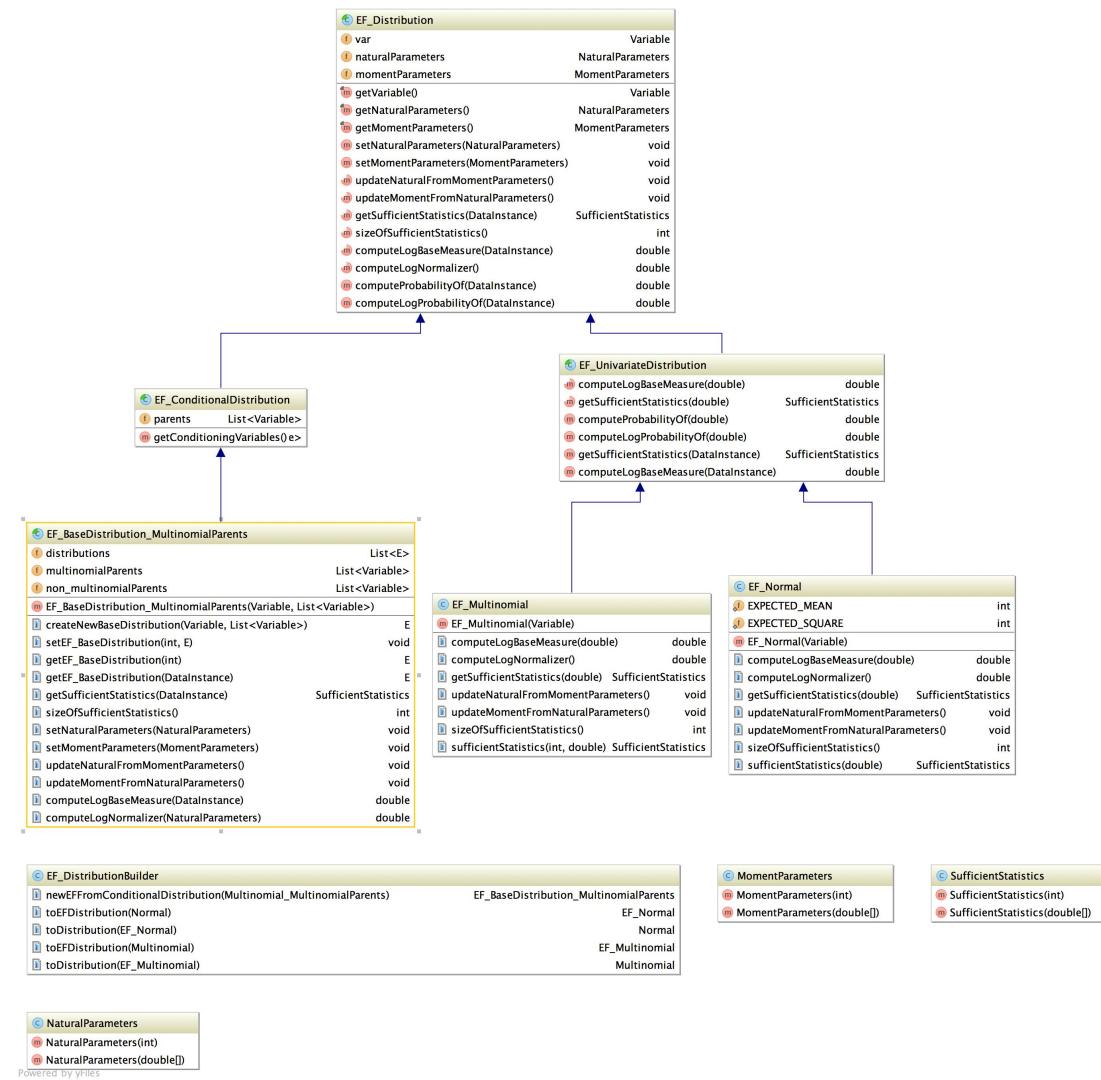
13.7 Package core.database.arffWekaReader



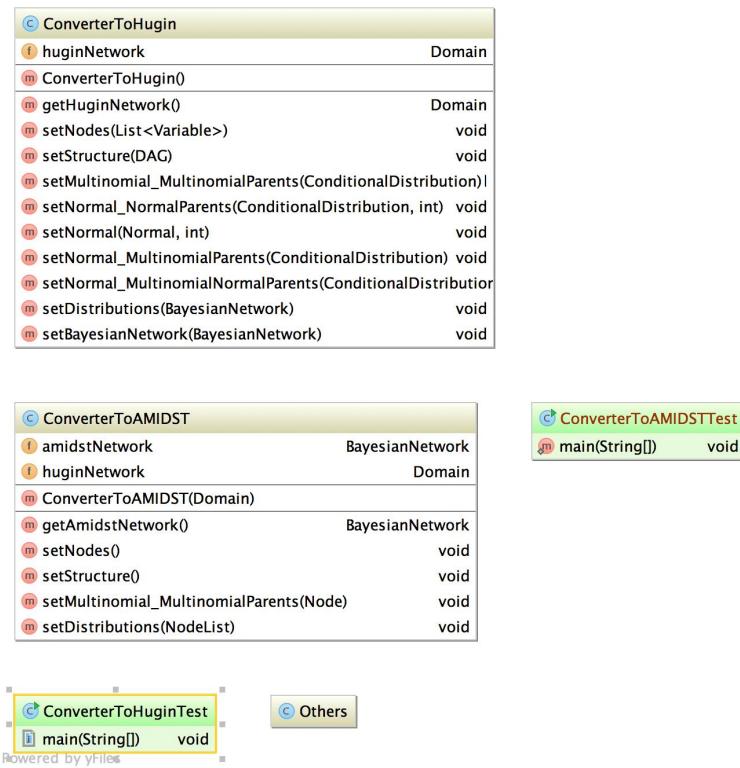
13.8 Package core.distribution



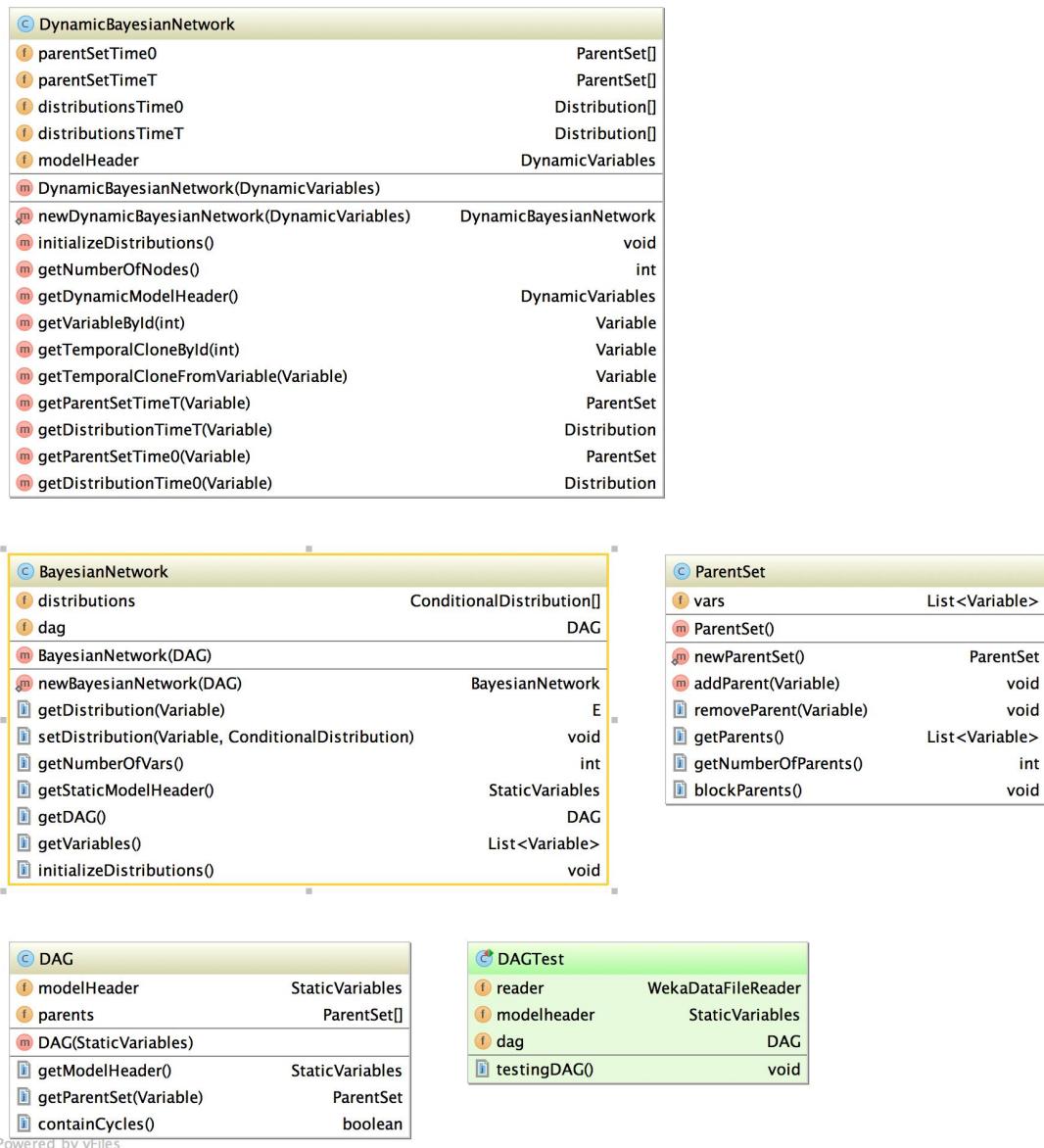
13.9 Package core.exponentialfamily



13.10 Package core.exponentialfamily

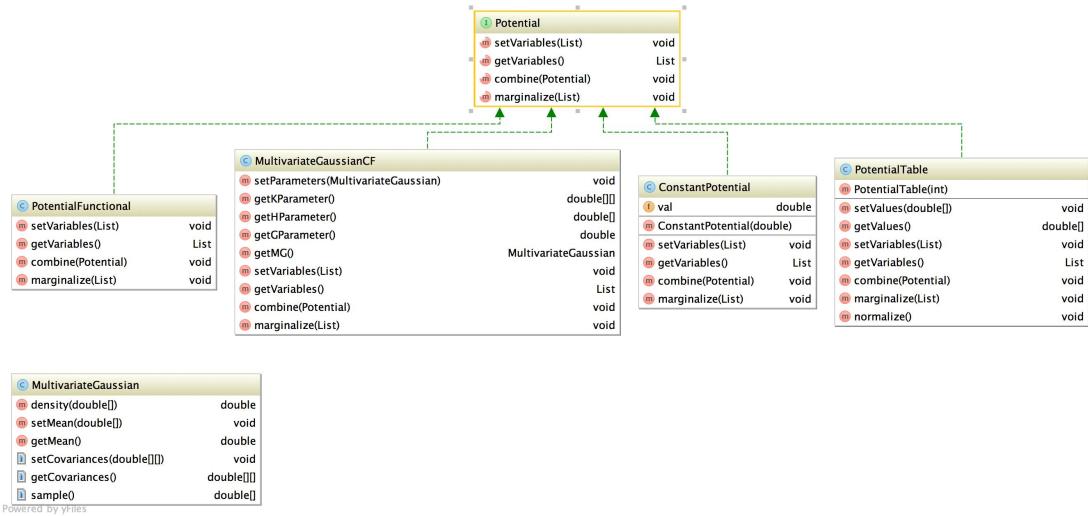


13.11 Package core.modelstructure

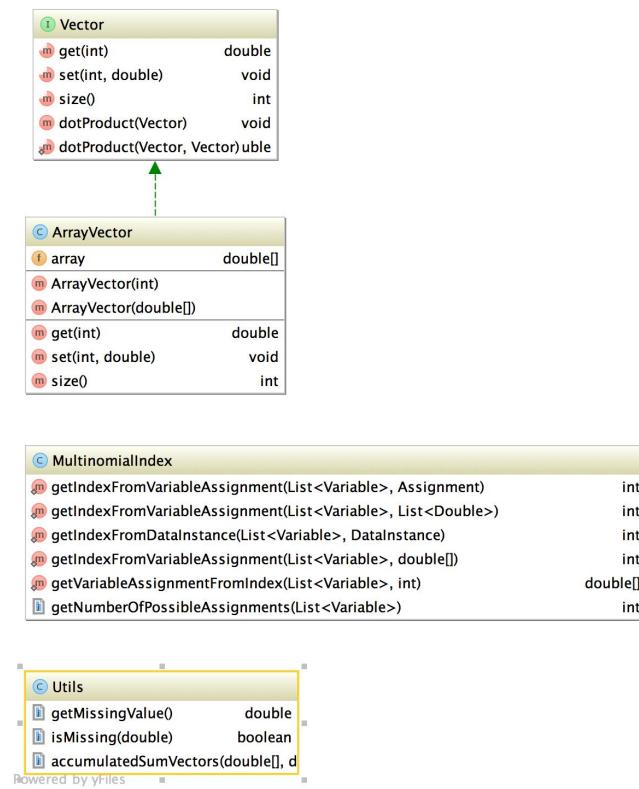


13.12 Package core.potential

Figure 1: Class diagram of the package: core.potential

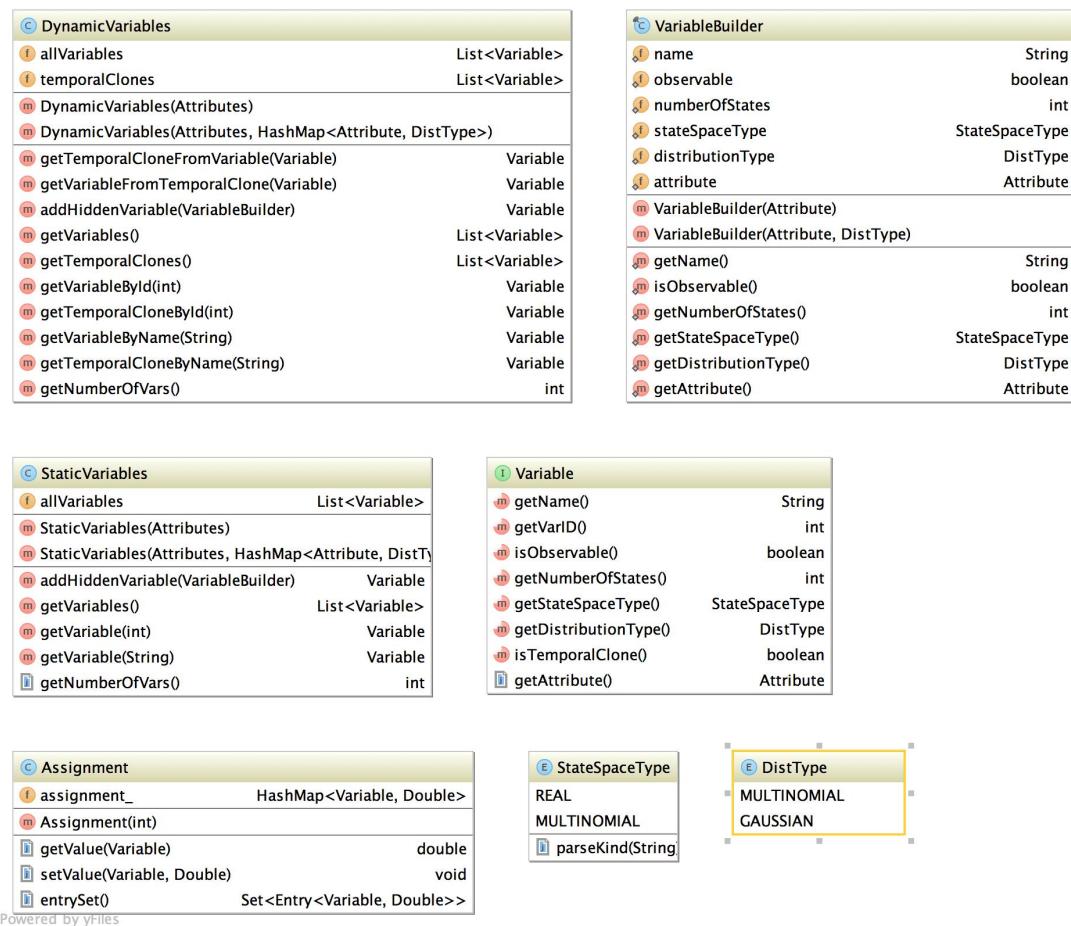


13.13 Package core.utils



13.14 Package core.variables

Figure 2: Class diagram of the package: `core.variables`



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Chapter 2

Hierarchical Index

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Class Index

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Chapter 4

Namespace Documentation

4.1 Package eu.amidst.core.database

Packages

- package [filereaders](#)

Classes

- class [Attribute](#)
- class [Attributes](#)
- interface [DataInstance](#)
- interface [DataOnDisk](#)
- interface [DataOnMemory](#)
- interface [DataOnStream](#)

4.1.1 Detailed Description

ISSUE LIST *****

1. The number of states should be parsed and stored.

***** ISSUE LIST *****

1. (Andres) Add a "close" method to close the possible linked file or whatever.

4.2 Package eu.amidst.core.database.filereaders

Classes

- interface [DataFileReader](#)
 - interface [DataRow](#)
 - class [DataRowMissing](#)
 - class [DynamicDataInstance](#)
 - class [DynamicDataOnDiskFromFile](#)
 - class [DynamicDataOnMemoryFromFile](#)
 - class [NextDynamicDataInstance](#)
-

- class [StaticDataInstance](#)
- class [StaticDataOnDiskFromFile](#)
- class [StaticDataOnMemoryFromFile](#)

4.2.1 Detailed Description

ISSUE LIST *****

1. We could eliminate the if(timerIDcounter == 1) in nextDataInstance_NoTimeID_NoSeq if we maintain a future [DataRow](#) (we read an extra row in advance). Then we would need the method public boolean isNull(){ return (present==null || past==null); }

4.3 Package eu.amidst.core.distribution

Classes

- class [ConditionalDistribution](#)
- class [Distribution](#)
- class [DistributionBuilder](#)
- class [Multinomial](#)
- class [Multinomial_MultinomialParents](#)
- class [Normal](#)
- class [Normal_MultinomialNormalParents](#)
- class [Normal_MultinomialParents](#)
- class [Normal_NormalParents](#)
- class [UnivariateDistribution](#)

4.3.1 Detailed Description

ISSUE LIST *****

1. In general, should we clone attributes in the constructor to avoid bad uses of input variables later on?
2. How are we going to update the probabilities? Value by value? Or directly with the whole set of probabilities? or both? Two methods are included: `setProbabilities(double[] probabilities)` and `setProbabilityOfState(int index, double value)`
3. Is needed the method `setProbabilityOfState` ?

***** ISSUE LIST *****

1. `getConditioningVariables` change to `getParentsVariables()`

ISSUE LIST *****

1. Do we need here the min and max of the variable, for instance, to check that the input value in `computeProbabilityOf(value)` is in the range [min,max]?

ISSUES *****

1. CODING: - `this.multinomialParents` or `multinomialParents`? Common criteria.
- methods are ordered? alphabetically?

ISSUE LIST *****

1. In the constructor, should we initialize the CLG attributes in this way?
2. The name of the method computeProbabilityOf(..) is a bit confusing for continuous domains. It does not compute probabilities but the value for the density function which is not a probability. However as this class implements this method of [ConditionalDistribution](#), we could leave like this.
3. QAPlug gives a warning when using the same name for a attribute and a given argument, e.g. this.var = var

4.4 Package eu.amidst.core.exponentialfamily

Classes

- class [EF_BaseDistribution_MultinomialParents< E extends EF_Distribution >](#)
- class [EF_ConditionalDistribution](#)
- class [EF_Distribution](#)
- class [EF_DistributionBuilder](#)
- class [EF_Multinomial](#)
- class [EF_Normal](#)
- class [EF_UnivariateDistribution](#)
- class [MomentParameters](#)
- class [NaturalParameters](#)
- class [SufficientStatistics](#)

4.4.1 Detailed Description

******* ISSUE LIST *******

1. getConditioningVariables change to getParentsVariables()

ISSUE LIST *****

1. Make SufficientStatics an static class to avoid the creation of an object in each call to getSuffStatistics();
2. Make naturalParameters and momentParameters statics?

4.5 Package eu.amidst.core.variables

Classes

- class [Assignment](#)
- enum [DistType](#)
- class [DynamicVariables](#)
- enum [StateSpaceType](#)
- class [StaticVariables](#)
- interface [Variable](#)
- class [VariableBuilder](#)

4.5.1 Detailed Description

ISSUE LIST *****

1. Rename to [DynamicVariables](#)
2. We can/should remove all setters from VariableImplementation right?
3. Is there any need for the field attrs? It is only used in the constructor.
4. If the fields in VariableImplementation are all objects then the TemporalClone only contains pointers, which would ensure consistency, although we are not planing to modify these values.

Chapter 5

Class Documentation

5.1 eu.amidst.core.database.filereaders.arffFileReader.ArffDataStream Class Reference

5.1.1 Detailed Description

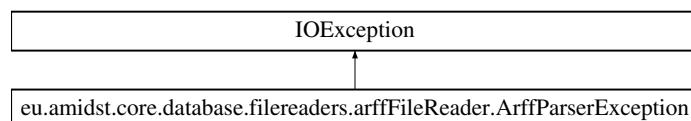
Created by sigveh on 10/7/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffFileReader/ArffDataStream.java

5.2 eu.amidst.core.database.filereaders.arffFileReader.ArffParserException Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.arffFileReader.ArffParserException:



Public Member Functions

- **ArffParserException** (String message)

5.2.1 Detailed Description

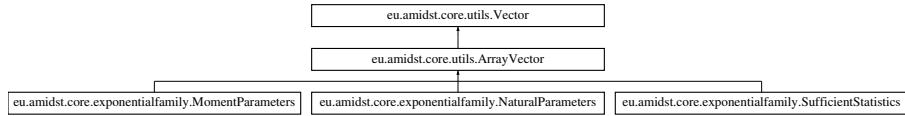
Created by sigveh on 10/8/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffFileReader/ArffParserException.java

5.3 eu.amidst.core.utils.ArrayVector Class Reference

Inheritance diagram for eu.amidst.core.utils.ArrayVector:



Public Member Functions

- **ArrayVector** (int size)
- **ArrayVector** (double[] vec)
- double **get** (int i)
- void **set** (int i, double val)
- int **size** ()

Additional Inherited Members

5.3.1 Detailed Description

Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/utils/ArrayVector.java

5.4 eu.amidst.core.variables.Assignment Class Reference

Public Member Functions

- **Assignment** (int nOfVars)
- double **getValue** ([Variable](#) key)
- void **setValue** ([Variable](#) var, Double value)
- Set< Map.Entry< [Variable](#), Double > > **entrySet** ()

5.4.1 Detailed Description

Created by ana@cs.aau.dk on 03/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/Assignment.java

5.5 eu.amidst.core.database.Attribute Class Reference

Public Member Functions

- **Attribute** (int index, String name, String unit, [StateSpaceType](#) stateSpaceType, int numberofStates)

- **Attribute** (int index, String name, [StateSpaceType](#) stateSpaceType, int numberOfStates)
- **Attribute** (String name, [StateSpaceType](#) stateSpaceType, int numberOfStates)
- int **getIndex** ()
- String **getUnit** ()
- String **getName** ()
- [StateSpaceType](#) **getStateSpaceType** ()
- int **getNumberOfStates** ()
- boolean **equals** (Object o)
- int **hashCode** ()

5.5.1 Detailed Description

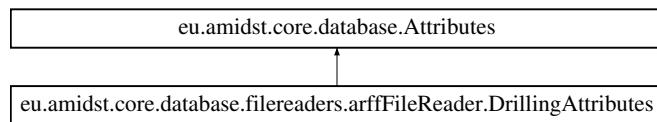
Created by sigveh on 10/20/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/Attribute.java

5.6 eu.amidst.core.database.Attributes Class Reference

Inheritance diagram for eu.amidst.core.database.Attributes:



Public Member Functions

- **Attributes** (List<> [Attribute](#) attributes)
- List<> [Attribute](#) > **getList** ()
- List<> [Attribute](#) > **getListExceptTimeAndSeq** ()
- void **print** ()
- [Attribute](#) **getAttributeByName** (String name)

5.6.1 Detailed Description

Created by sigveh on 10/16/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/Attributes.java

5.7 eu.amidst.core.modelstructure.BayesianNetwork Class Reference

Public Member Functions

- void **setDistribution** ([Variable](#) var, [ConditionalDistribution](#) distribution)
- int **getNumberOfVars** ()
- [StaticVariables](#) **getStaticVariables** ()
- [DAG](#) **getDAG** ()
- List<> [Variable](#) > **getVariables** ()

Static Public Member Functions

- static [BayesianNetwork](#) **newBayesianNetwork** ([DAG](#) dag)

5.7.1 Detailed Description

Created by afa on 02/07/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/modelstructure/BayesianNetwork.java

5.8 eu.amidst.core.database.dynamics.BucketSequenceData Interface Reference

Public Member Functions

- int **getMarkovOrder** ()
- boolean **hasMoreData** ()
- [DynamicDataInstance](#) **nextSequenceData** ()
- boolean **isResetable** ()
- void **reset** ()

5.8.1 Detailed Description

Created by afa on 03/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/dynamics/BucketSequenceData.java

5.9 eu.amidst.core.database.dynamics.BucketSequenceStream Interface Reference

Public Member Functions

- [Attributes](#) **getDynamicAttributes** ()
- int **getMarkovOrder** ()
- boolean **hasMoreData** ()
- [BucketSequenceData](#) **nextBucketSequenceData** ()
- boolean **isResetable** ()
- void **reset** ()

5.9.1 Detailed Description

Created by afa on 03/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/dynamics/BucketSequenceStream.java

5.10 eu.amidst.staticmodelling.models.Classifier Interface Reference

Public Member Functions

- `double[] predict (DataInstance instance)`
- `int getClassVarID ()`
- `void setClassVarID (int varID)`

5.10.1 Detailed Description

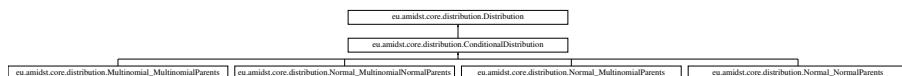
Created by afa on 02/07/14.

The documentation for this interface was generated from the following file:

- `/Users/ana/Documents/core/src/main/java/eu/amidst/staticmodelling/models/Classifier.java`

5.11 eu.amidst.core.distribution.ConditionalDistribution Class Reference

Inheritance diagram for eu.amidst.core.distribution.ConditionalDistribution:



Public Member Functions

- `List< Variable > getConditioningVariables ()`
- `double getConditionalProbability (Assignment assignment)`
- `abstract double getLogConditionalProbability (Assignment assignment)`

Protected Attributes

- `List< Variable > parents`

5.11.1 Detailed Description

This interface generalizes the set of possible conditional distributions.

Author

Antonio Fernández

Version

1.0

Since

2014-11-3

5.11.2 Member Function Documentation

5.11.2.1 double eu.amidst.core.distribution.ConditionalDistribution.getConditionalProbability (*Assignment assignment*)

Evaluates the conditional distribution given a value of the variable and an assignment of the parents.

Parameters

| | |
|-------------------------|--------------------------------|
| <code>assignment</code> | An Assignment for the parents. |
|-------------------------|--------------------------------|

Returns

A double value with the evaluated distribution.

5.11.2.2 List<Variable> eu.amidst.core.distribution.ConditionalDistribution.getConditioningVariables()

Gets the set of conditioning variables

Returns

An unmodifiable List object with the set of conditioning variables.

5.11.2.3 abstract double eu.amidst.core.distribution.ConditionalDistribution.getLogConditionalProbability(Assignment assignment) [abstract]

Evaluates the conditional distribution given a value of the variable and an assignment of the parents.

Parameters

| | |
|-------------------------|--------------------------------|
| <code>assignment</code> | An Assignment for the parents. |
|-------------------------|--------------------------------|

Returns

A double value with the logarithm of the evaluated distribution.

5.11.3 Member Data Documentation**5.11.3.1 List<Variable> eu.amidst.core.distribution.ConditionalDistribution.parents [protected]**

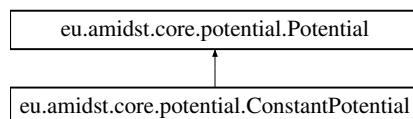
The list of parents of the variable

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/ConditionalDistribution.java

5.12 eu.amidst.core.potential.ConstantPotential Class Reference

Inheritance diagram for eu.amidst.core.potential.ConstantPotential:

**Public Member Functions**

- **ConstantPotential** (double val)
- void **setVariables** (List variables)
- List **getVariables** ()
- void **combine** (Potential pot)
- void **marginalize** (List variables)

5.12.1 Detailed Description

Created by andresmasegosa on 28/08/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/ConstantPotential.java

5.13 eu.amidst.core.huginlink.ConverterToAMIDST Class Reference

Public Member Functions

- **ConverterToAMIDST** (Domain huginNetwork)
- **BayesianNetwork getAmidstNetwork ()**
- void **setNodes ()**
- void **setStructure ()**
- void **setMultinomial_MultinomialParents** (Node huginVar)
- void **setDistributions** (NodeList huginNodes)

5.13.1 Detailed Description

Created by afa on 14/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/huginlink/ConverterToAMIDST.java

5.14 eu.amidst.core.huginlink.ConverterToHugin Class Reference

Public Member Functions

- Domain **getHuginNetwork ()**
- void **setNodes** (List< Variable > amidstVars)
- void **setStructure** (DAG dag)
- void **setMultinomial_MultinomialParents** (ConditionalDistribution dist)
- void **setNormal_NormalParents** (ConditionalDistribution dist, int assign_i)
- void **setNormal** (Normal dist, int i)
- void **setNormal_MultinomialParents** (ConditionalDistribution dist)
- void **setNormal_MultinomialNormalParents** (ConditionalDistribution dist)
- void **setDistributions** (BayesianNetwork bn)
- void **setBayesianNetwork** (BayesianNetwork bn)

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/huginlink/ConverterToHugin.java

5.15 eu.amidst.core.modelstructure.DAG Class Reference

Public Member Functions

- **DAG** (**StaticVariables** variables)
- **StaticVariables getVariables ()**
- **ParentSet getParentSet** (Variable var)
- boolean **containCycles ()**

5.15.1 Detailed Description

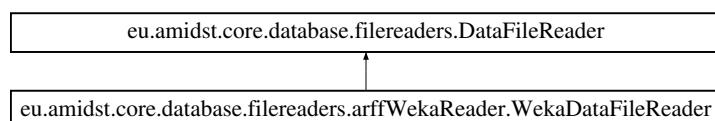
Created by Hanen on 13/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/modelstructure/DAG.java

5.16 eu.amidst.core.database.filereaders.DataFileReader Interface Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DataFileReader:



Public Member Functions

- **Attributes** `getAttributes ()`
- **DataRow** `nextDataRow ()`
- boolean `hasMoreDataRows ()`
- void `reset ()`
- boolean `doesItReadThisFileExtension` (String fileExtension)

5.16.1 Detailed Description

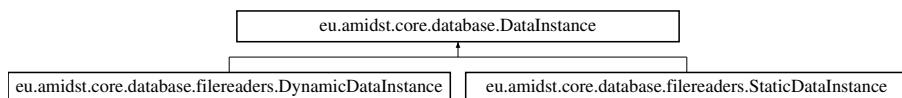
Created by andresmasegosa on 11/11/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DataFileReader.java

5.17 eu.amidst.core.database.DataInstance Interface Reference

Inheritance diagram for eu.amidst.core.database.DataInstance:



Public Member Functions

- double `getValue` (**Variable** var)
- int `getSequenceID ()`
- int `getTimeID ()`

5.17.1 Detailed Description

Created by ana@cs.aau.dk on 10/11/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/DataInstance.java

5.18 eu.amidst.core.database.DataOnDisk Interface Reference

Inheritance diagram for eu.amidst.core.database.DataOnDisk:



Public Member Functions

- **DataInstance** `nextDataInstance ()`
- boolean `hasMoreDataInstances ()`
- **Attributes** `getAttributes ()`
- void `restart ()`

5.18.1 Detailed Description

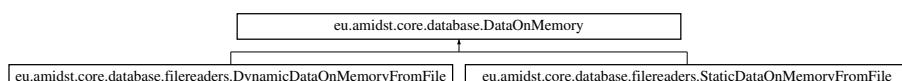
Created by afa on 02/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/DataOnDisk.java

5.19 eu.amidst.core.database.DataOnMemory Interface Reference

Inheritance diagram for eu.amidst.core.database.DataOnMemory:



Public Member Functions

- int `getNumberOfDataInstances ()`
- **DataInstance** `getDataInstance (int i)`
- **Attributes** `getAttributes ()`

5.19.1 Detailed Description

Created by andresmasegosa on 11/11/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/DataOnMemory.java

5.20 eu.amidst.core.database.DataOnStream Interface Reference

Inheritance diagram for eu.amidst.core.database.DataOnStream:



Public Member Functions

- **DataInstance** `nextDataInstance ()`
- boolean `hasMoreDataInstances ()`
- **Attributes** `getAttributes ()`

5.20.1 Detailed Description

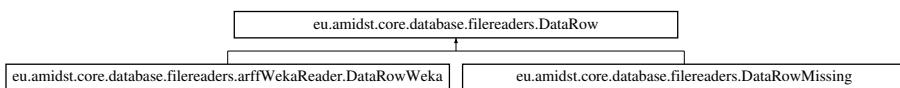
Created by afa on 02/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/DataOnStream.java

5.21 eu.amidst.core.database.filereaders.DataRow Interface Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DataRow:



Public Member Functions

- double `getValue (Attribute att)`

5.21.1 Detailed Description

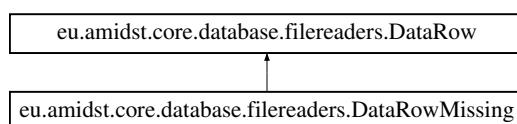
Created by andresmasegosa on 11/11/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DataRow.java

5.22 eu.amidst.core.database.filereaders.DataRowMissing Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DataRowMissing:



Public Member Functions

- double **getValue** ([Attribute](#) att)

5.22.1 Detailed Description

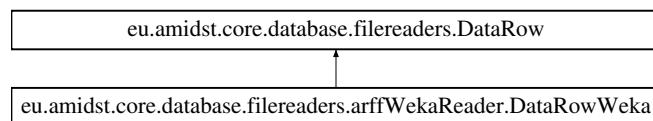
Created by [ana@cs.aau.dk](#) on 13/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DataRowMissing.java

5.23 eu.amidst.core.database.filereaders.arffWekaReader.DataRowWeka Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.arffWekaReader.DataRowWeka:



Public Member Functions

- **DataRowWeka** (Instance `dataRow`)
- double **getValue** ([Attribute](#) att)

5.23.1 Detailed Description

Created by [ana@cs.aau.dk](#) on 14/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffWekaReader/DataRowWeka.java

5.24 eu.amidst.core.distribution.Distribution Class Reference

Inheritance diagram for eu.amidst.core.distribution.Distribution:



Public Member Functions

- **Variable getVariable ()**

Protected Attributes

- [Variable var](#)

5.24.1 Detailed Description

Created by afa on 12/11/14.

5.24.2 Member Function Documentation

5.24.2.1 Variable eu.amidst.core.distribution.Distribution.getVariable()

Gets the variable of the distribution

Returns

A [Variable](#) object.

5.24.3 Member Data Documentation

5.24.3.1 Variable eu.amidst.core.distribution.Distribution.var [protected]

The variable of the distribution

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Distribution.java

5.25 eu.amidst.core.distribution.DistributionBuilder Class Reference

Static Public Member Functions

- static [ConditionalDistribution newDistribution](#) ([Variable](#) mainVar, List<[Variable](#)> conditioningVars)

5.25.1 Detailed Description

Created by andresmasegosa on 11/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/DistributionBuilder.java

5.26 eu.amidst.core.variables.DistType Enum Reference

Public Attributes

- **MULTINOMIAL**

5.26.1 Detailed Description

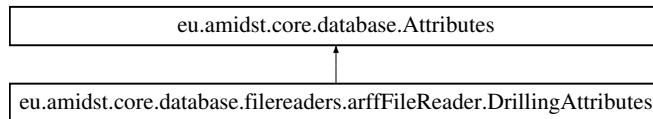
Created by Hanen on 05/11/14.

The documentation for this enum was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/DistType.java

5.27 eu.amidst.core.database.filereaders.arffFileReader.DrillingAttributes Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.arffFileReader.DrillingAttributes:



Public Member Functions

- Attribute **getMFI** ()
- Attribute **getRPM** ()
- Attribute **getSPP** ()
- List< Attribute > **getList** ()
- void **print** ()
- Attribute **getAttributeByName** (String name)

5.27.1 Detailed Description

Created by sigveh on 10/16/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffFileReader/DrillingAttributes.java

5.28 eu.amidst.core.modelstructure.DynamicBayesianNetwork Class Reference

Public Member Functions

- void **initializeDistributions** ()
- int **getNumberOfNodes** ()
- DynamicVariables **getDynamicVariables** ()
- Variable **getVariableById** (int varID)
- Variable **getTemporalCloneById** (int varID)
- Variable **getTemporalCloneFromVariable** (Variable variable)
- ParentSet **getParentSetTimeT** (Variable var)
- Distribution **getDistributionTimeT** (Variable var)
- ParentSet **getParentSetTime0** (Variable var)
- Distribution **getDistributionTime0** (Variable var)

Static Public Member Functions

- static [DynamicBayesianNetwork newDynamicBayesianNetwork \(DynamicVariables variables\)](#)

5.28.1 Detailed Description

This class implements a dynamic Bayesian network.

Author

a.alvarez@ual.es, andres@cs.aau.dk & ana@cs.aau.dk

Version

1.0

Since

2014-07-3

5.28.2 Member Function Documentation

5.28.2.1 void eu.amidst.core.modelstructure.DynamicBayesianNetwork.initializeDistributions ()

Initialize the Distributions of the variables based on their StateSpaceType

5.28.2.2 static DynamicBayesianNetwork eu.amidst.core.modelstructure.DynamicBayesianNetwork.newDynamicBayesianNetwork (DynamicVariables variables) [static]

The class public constructor, as a factory pattern

Parameters

| | |
|------------------------|------------------------------------|
| <code>variables</code> | The variables or list of variables |
|------------------------|------------------------------------|

Returns

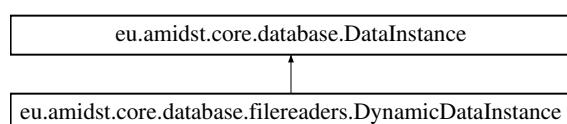
A [DynamicBayesianNetwork](#) with the given list of variables

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/modelstructure/DynamicBayesianNetwork.java

5.29 eu.amidst.core.database.filereaders.DynamicDataInstance Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DynamicDataInstance:



Public Member Functions

- **DynamicDataInstance** (`DataRow` `dataRowPast_`, `DataRow` `dataRowPresent_`, int `sequenceID_`, int `timeID_`)
- double **getValue** (`Variable` `var`)
- int **getSequenceID** ()
- int **getTimeID** ()

5.29.1 Detailed Description

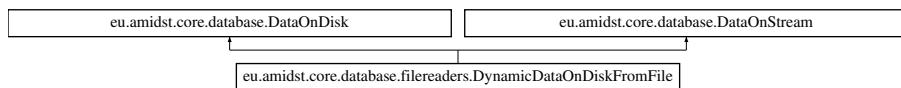
Created by andresmasegosa on 11/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DynamicDataInstance.java

5.30 eu.amidst.core.database.filereaders.DynamicDataOnDiskFromFile Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DynamicDataOnDiskFromFile:



Public Member Functions

- **DynamicDataOnDiskFromFile** (`DataFileReader` `reader`)
- **DataInstance** **nextDataInstance** ()
- boolean **hasMoreDataInstances** ()
- **Attributes** **getAttributes** ()
- void **restart** ()

5.30.1 Detailed Description

Created by `ana@cs.aau.dk` on 12/11/14.

5.30.2 Constructor & Destructor Documentation

5.30.2.1 eu.amidst.core.database.filereaders.DynamicDataOnDiskFromFile.DynamicDataOnDiskFromFile (`DataFileReader` `reader`)

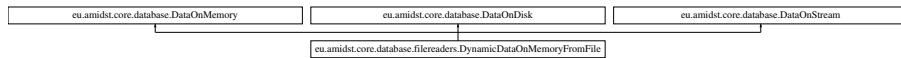
We read the two first rows now, to create the first couple in nextDataInstance

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DynamicDataOnDiskFromFile.java

5.31 eu.amidst.core.database.filereaders.DynamicDataOnMemoryFromFile Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.DynamicDataOnMemoryFromFile:



Public Member Functions

- **DynamicDataOnMemoryFromFile** ([DataReader](#) reader)
- int **getNumberOfDataInstances** ()
- **DataInstance getDataInstance** (int i)
- **Attributes getAttributes** ()
- **DataInstance nextDataInstance** ()
- boolean **hasMoreDataInstances** ()
- void **restart** ()

5.31.1 Detailed Description

Created by [ana@cs.aau.dk](#) on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/DynamicDataOnMemoryFromFile.java

5.32 eu.amidst.core.variables.DynamicVariables Class Reference

Public Member Functions

- **DynamicVariables** ([Attributes](#) atts)
- **DynamicVariables** ([Attributes](#) atts, [HashMap](#)< [Attribute](#), [DistType](#) > typeDists)
- **Variable getTemporalCloneFromVariable** ([Variable](#) var)
- **Variable getVariableFromTemporalClone** ([Variable](#) var)
- **Variable addHiddenVariable** ([VariableBuilder](#) builder)
- [List](#)< [Variable](#) > **getVariables** ()
- [List](#)< [Variable](#) > **getTemporalClones** ()
- **Variable getVariableById** (int varID)
- **Variable getTemporalCloneById** (int varID)
- **Variable getVariableByName** (String name)
- **Variable getTemporalCloneByName** (String name)
- int **getNumberOfVars** ()

5.32.1 Detailed Description

Created by afa on 02/07/14.

5.32.2 Constructor & Destructor Documentation

5.32.2.1 eu.amidst.core.variables.DynamicVariables.DynamicVariables (Attributes *atts*, HashMap< Attribute, DistType > *typeDists*)

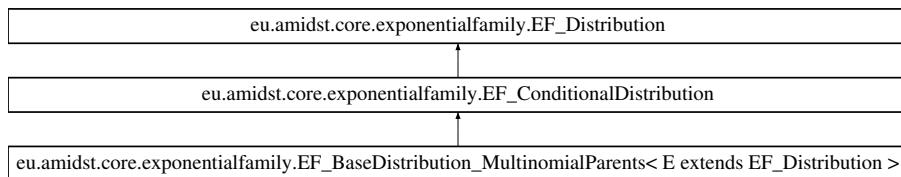
Constructor where the distribution type of random variables is provided as an argument.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/DynamicVariables.java

5.33 eu.amidst.core.exponentialfamily.EF_BaseDistribution_MultinomialParents< E extends EF_Distribution > Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_BaseDistribution_MultinomialParents< E extends EF_Distribution >:



Public Member Functions

- **EF_BaseDistribution_MultinomialParents** (*Variable var*, List< *Variable* > *parents*)
- abstract *E* **createNewBaseDistribution** (*Variable var*, List< *Variable* > *non_multinomialParents*)
- void **setEF_BaseDistribution** (int *indexMultinomial*, *E baseDist*)
- *E* **getEF_BaseDistribution** (int *indexMultinomial*)
- *E* **getEF_BaseDistribution** (*DataInstance dataInstance*)
- **SufficientStatistics getSufficientStatistics** (*DataInstance instance*)
- int **sizeOfSufficientStatistics** ()
- void **setNaturalParameters** (*NaturalParameters parameters*)
- void **setMomentParameters** (*MomentParameters parameters*)
- void **updateNaturalFromMomentParameters** ()
- void **updateMomentFromNaturalParameters** ()
- double **computeLogBaseMeasure** (*DataInstance dataInstance*)
- double **computeLogNormalizer** (*NaturalParameters parameters*)

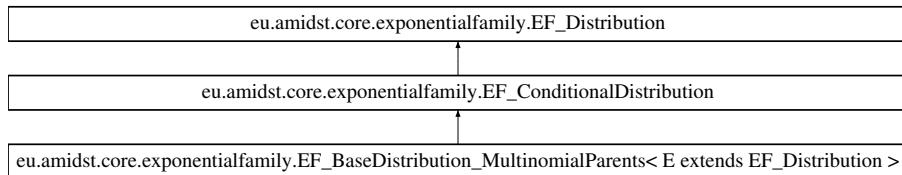
Additional Inherited Members

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_BaseDistribution_MultinomialParents.java

5.34 eu.amidst.core.exponentialfamily.EF_ConditionalDistribution Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_ConditionalDistribution:



Public Member Functions

- List< [Variable](#) > **getConditioningVariables** ()

Protected Attributes

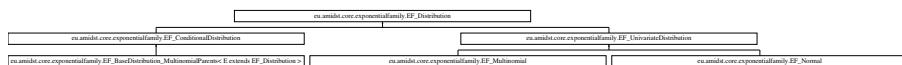
- List< [Variable](#) > **parents**

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_ConditionalDistribution.java

5.35 eu.amidst.core.exponentialfamily.EF_Distribution Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_Distribution:



Public Member Functions

- final [Variable](#) **getVariable** ()
- final [NaturalParameters](#) **getNaturalParameters** ()
- final [MomentParameters](#) **getMomentParameters** ()
- void **setNaturalParameters** ([NaturalParameters](#) parameters)
- void **setMomentParameters** ([MomentParameters](#) parameters)
- abstract void **updateNaturalFromMomentParameters** ()
- abstract void **updateMomentFromNaturalParameters** ()
- abstract [SufficientStatistics](#) **getSufficientStatistics** ([DataInstance](#) data)
- abstract int **sizeOfSufficientStatistics** ()
- abstract double **computeLogBaseMeasure** ([DataInstance](#) datainstance)
- abstract double **computeLogNormalizer** ()
- double **computeProbabilityOf** ([DataInstance](#) datainstance)
- double **computeLogProbabilityOf** ([DataInstance](#) datainstance)

Protected Attributes

- [Variable](#) var
- [NaturalParameters](#) **naturalParameters**
- [MomentParameters](#) **momentParameters**

5.35.1 Detailed Description

Created by andresmasegosa on 13/11/14.

5.35.2 Member Function Documentation

5.35.2.1 final Variable eu.amidst.core.exponentialfamily.EF_Distribution.getVariable()

Gets the variable of the distribution

Returns

A `Variable` object.

5.35.3 Member Data Documentation

5.35.3.1 Variable eu.amidst.core.exponentialfamily.EF_Distribution.var [protected]

The variable of the distribution

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_Distribution.java

5.36 eu.amidst.core.exponentialfamily.EF_DistributionBuilder Class Reference

Static Public Member Functions

- static `EF_BaseDistribution_MultinomialParents newEFFromConditionalDistribution (Multinomial_MultinomialParents dist)`
- static `EF_Normal toEFDistribution (Normal dist)`
- static `Normal toDistribution (EF_Normal ef_normal)`
- static `EF_Multinomial toEFDistribution (Multinomial dist)`
- static `Multinomial toDistribution (EF_Multinomial ef_multinomial)`

5.36.1 Detailed Description

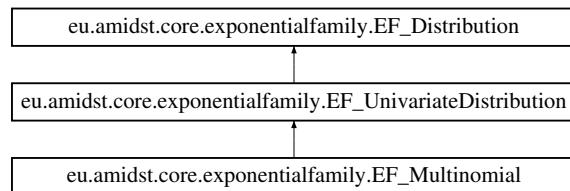
Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_DistributionBuilder.java

5.37 eu.amidst.core.exponentialfamily.EF_Multinomial Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_Multinomial:



Public Member Functions

- **EF_Multinomial (Variable var_)**
- double **computeLogBaseMeasure** (double val)
- double **computeLogNormalizer** ()
- **SufficientStatistics getSufficientStatistics** (double val)
- void **updateNaturalFromMomentParameters** ()
- void **updateMomentFromNaturalParameters** ()
- int **sizeOfSufficientStatistics** ()

Static Public Member Functions

- static **SufficientStatistics sufficientStatistics** (int nstates, double val)

Additional Inherited Members

5.37.1 Detailed Description

Created by andresmasegosa on 13/11/14.

5.37.2 Constructor & Destructor Documentation

5.37.2.1 eu.amidst.core.exponentialfamily.EF_Multinomial.EF_Multinomial (Variable var_)

The class constructor.

Parameters

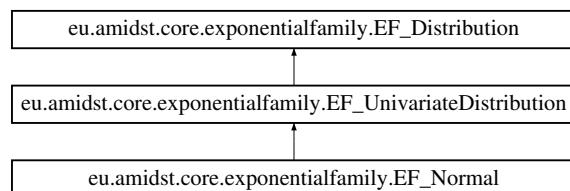
| | |
|-------------|-----------------------------------|
| <i>var_</i> | The variable of the distribution. |
|-------------|-----------------------------------|

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_Multinomial.java

5.38 eu.amidst.core.exponentialfamily.EF_Normal Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_Normal:



Public Member Functions

- **EF_Normal (Variable var_)**
- double **computeLogBaseMeasure** (double val)
- double **computeLogNormalizer** ()
- **SufficientStatistics getSufficientStatistics** (double val)
- void **updateNaturalFromMomentParameters** ()
- void **updateMomentFromNaturalParameters** ()
- int **sizeOfSufficientStatistics** ()

Static Public Member Functions

- static **SufficientStatistics sufficientStatistics** (double val)

Static Public Attributes

- static int **EXPECTED_MEAN** = 0
- static int **EXPECTED_SQUARE** = 1

Additional Inherited Members

5.38.1 Detailed Description

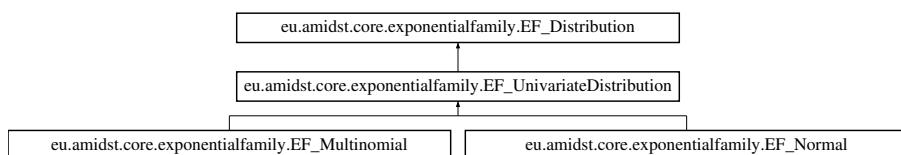
Created by andresmasegosa on 13/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_Normal.java

5.39 eu.amidst.core.exponentialfamily.EF_UnivariateDistribution Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.EF_UnivariateDistribution:



Public Member Functions

- abstract double **computeLogBaseMeasure** (double val)
- abstract **SufficientStatistics getSufficientStatistics** (double val)
- double **computeProbabilityOf** (double val)
- double **computeLogProbabilityOf** (double val)
- **SufficientStatistics getSufficientStatistics** (**DataInstance** data)
- double **computeLogBaseMeasure** (**DataInstance** dataInstance)

Additional Inherited Members

5.39.1 Detailed Description

Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/EF_UnivariateDistribution.java

5.40 eu.amidst.core.database.filereaders.arffFileReader.Keys Class Reference

Public Member Functions

- **Keys** (int[] doubleKeys, int[] intKeys)
- int[] **getDoubleKeys** ()
- int[] **getIntKeys** ()

5.40.1 Detailed Description

Created by sigveh on 10/20/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffFileReader/Keys.java

5.41 eu.amidst.Main Class Reference

Static Public Member Functions

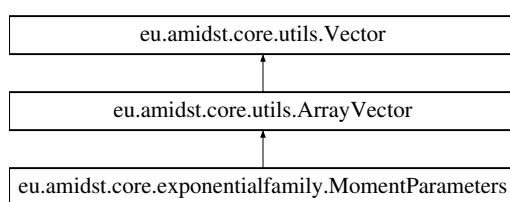
- static void **main** (String[] args)

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/Main.java

5.42 eu.amidst.core.exponentialfamily.MomentParameters Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.MomentParameters:



Public Member Functions

- **MomentParameters** (int size)
- **MomentParameters** (double[] vec)

Additional Inherited Members

5.42.1 Detailed Description

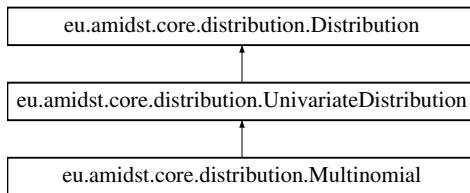
Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/MomentParameters.java

5.43 eu.amidst.core.distribution.Multinomial Class Reference

Inheritance diagram for eu.amidst.core.distribution.Multinomial:



Public Member Functions

- **Multinomial (Variable var)**
- void **setProbabilities** (double[] probabilities)
- void **setProbabilityOfState** (int state, double prob)
- double **getProbabilityOfState** (int state)
- double[] **getProbabilities** ()
- double **getLogProbability** (double value)

Additional Inherited Members

5.43.1 Detailed Description

This class implements a univariate multinomial distribution.

Author

Antonio Fernández

Version

1.0

Since

2014-11-3

5.43.2 Constructor & Destructor Documentation

5.43.2.1 eu.amidst.core.distribution.Multinomial.Multinomial (Variable var)

The class constructor.

Parameters

| | |
|------------|-----------------------------------|
| <i>var</i> | The variable of the distribution. |
|------------|-----------------------------------|

5.43.3 Member Function Documentation**5.43.3.1 double eu.amidst.core.distribution.Multinomial.getLogProbability (double *value*)**

Computes the logarithm of the probability for a given variable state.

Parameters

| | |
|--------------|--|
| <i>value</i> | The position of the variable state in the array of probabilities (represented as a double for generality reasons). |
|--------------|--|

Returns

A double value with the logarithm of the probability.

5.43.3.2 double [] eu.amidst.core.distribution.Multinomial.getProbabilities ()

Gets the array of probabilities for the different states of the variable.

Returns

An array of double with the probabilities.

5.43.3.3 double eu.amidst.core.distribution.Multinomial.getProbabilityOfState (int *state*)**Parameters**

| |
|--------------|
| <i>state</i> |
|--------------|

Returns**5.43.3.4 void eu.amidst.core.distribution.Multinomial.setProbabilities (double[] *probabilities*)**

Sets the probability values to the distribution.

Parameters

| | |
|----------------------|---|
| <i>probabilities</i> | An array of probabilities in the same order as the variable states. |
|----------------------|---|

5.43.3.5 void eu.amidst.core.distribution.Multinomial.setProbabilityOfState (int *state*, double *prob*)

Set a probability value in a given position in the array of probabilities.

Parameters

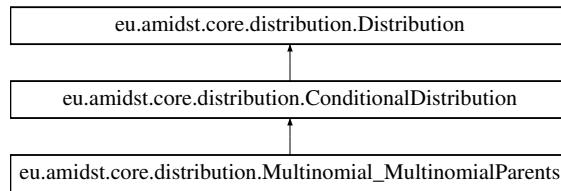
| | |
|--------------|---|
| <i>state</i> | The position in which the probability is set. |
| <i>prob</i> | A probability value. |

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Multinomial.java

5.44 eu.amidst.core.distribution.Multinomial_MultinomialParents Class Reference

Inheritance diagram for eu.amidst.core.distribution.Multinomial_MultinomialParents:



Public Member Functions

- [Multinomial_MultinomialParents \(Variable var, List< Variable > parents\)](#)
- [Multinomial\[\] getProbabilities \(\)](#)
- void [setMultinomial \(int position, Multinomial multinomialDistribution\)](#)
- void [setMultinomial \(Assignment parentAssignment, Multinomial multinomialDistribution\)](#)
- [Multinomial getMultinomial \(Assignment parentAssignment\)](#)
- [Multinomial getMultinomial \(int position\)](#)
- double [getLogConditionalProbability \(Assignment parentAssignment\)](#)

Additional Inherited Members

5.44.1 Detailed Description

This class implements a conditional distribution of a multinomial variable given a set of multinomial parents.

Author

Antonio Fernández

Version

1.0

Since

2014-11-4

5.44.2 Constructor & Destructor Documentation

5.44.2.1 eu.amidst.core.distribution.Multinomial_MultinomialParents (Variable var, List< Variable > parents)

The class constructor.

Parameters

| | |
|----------------|-------------------------------------|
| <i>var</i> | The variable of the distribution. |
| <i>parents</i> | The set of parents of the variable. |

5.44.3 Member Function Documentation

5.44.3.1 double eu.amidst.core.distribution.Multinomial_MultinomialParents.getLogConditionalProbability (Assignment *parentAssignment*)

Computes the logarithm of the probability of the variable for a given state and a parent assignment.

Parameters

| | |
|-------------------------|--------------------------------|
| <i>parentAssignment</i> | An Assignment for the parents. |
|-------------------------|--------------------------------|

Returns

A double value with the logarithm of the probability.

5.44.3.2 Multinomial eu.amidst.core.distribution.Multinomial_MultinomialParents.getMultinomial (Assignment *parentAssignment*)

Gets the [Multinomial](#) distribution for given a parents assignment.

Parameters

| | |
|-------------------------|--------------------------------|
| <i>parentAssignment</i> | An Assignment for the parents. |
|-------------------------|--------------------------------|

Returns

A [Multinomial](#) object.

5.44.3.3 void eu.amidst.core.distribution.Multinomial_MultinomialParents.setMultinomial (int *position*, [Multinomial](#) *multinomialDistribution*)

Sets a [Multinomial](#) distribution in a given position in the array of probabilities.

Parameters

| | |
|--------------------------------|--|
| <i>position</i> | The position in which the distribution is set. |
| <i>multinomialDistribution</i> | A Multinomial object. |

5.44.3.4 void eu.amidst.core.distribution.Multinomial_MultinomialParents.setMultinomial (Assignment *parentAssignment*, [Multinomial](#) *multinomialDistribution*)

Sets a [Multinomial](#) distribution in a position in the array of probabilities determined by a given parents assignment.

Parameters

| | |
|---|--|
| <i>parent</i> ↪ <i>Assignment</i> | An Assignment for the parents. |
| <i>multinomial</i> ↪ <i>Distribution</i> | A Multinomial object. |

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Multinomial_MultinomialParents.java

5.45 eu.amidst.core.utils.MultinomialIndex Class Reference

Static Public Member Functions

- static int [getIndexFromVariableAssignment](#) (List< Variable > vars, [Assignment](#) assignment)
- static int [getIndexFromVariableAssignment](#) (List< Variable > vars, List< Double > assignment)
- static int [getIndexFromDataInstance](#) (List< Variable > vars, [DataInstance](#) dataInstance)
- static int [getIndexFromVariableAssignment](#) (List< Variable > vars, double[] assignment)
- static double[] [getVariableAssignmentFromIndex](#) (List< Variable > vars, int index)
- static int [getNumberOfPossibleAssignments](#) (List< Variable > vars)

5.45.1 Detailed Description

This class implements various static methods useful when indexing arrays of distributions involving multinomial variables.

Author

Antonio Fernández

Version

1.0

Since

2014-11-4

5.45.2 Member Function Documentation

5.45.2.1 static int eu.amidst.core.utils.MultinomialIndex.getIndexFromVariableAssignment (List< Variable > vars, Assignment assignment) [static]

Computes the order of an assignment when indexing the set of possible values for a set of multinomial variables.

Example: Let X, Y and Z three multinomial variables with states {0,1}, {0,1} and {0,1,2} respectively. Then, they are indexed as:

```
X Y Z Index
0 0 0 0
1 0 0 1
0 1 0 2
1 1 0 3
0 0 1 4
1 0 1 5
0 1 1 6
1 1 1 7
0 0 2 8
1 0 2 9
0 1 2 10
1 1 2 11
```

So, for instance $\text{Index}(0,0,2) = 8$.

Parameters

| | |
|-------------------|--------------------------------------|
| <i>vars</i> | A List of variables. |
| <i>assignment</i> | A Assignment for a set of variables. |

Returns

The index of the corresponding assignment among the possible ones.

5.45.2.2 static int eu.amidst.core.utils.MultinomialIndex.getIndexFromVariableAssignment (List< Variable > *vars*, List< Double > *assignment*) [static]

Computes the order of an assignment when indexing the set of possible values for a set of multinomial variables.

Parameters

| | |
|-------------------|--|
| <i>vars</i> | A List of variables. |
| <i>assignment</i> | A List of double values for the variables in the same order. |

Returns

The index of the corresponding assignment among the possible ones.

5.45.2.3 static int eu.amidst.core.utils.MultinomialIndex.getIndexFromVariableAssignment (List< Variable > *vars*, double[] *assignment*) [static]

Computes the order of an assignment when indexing the set of possible values for a set of multinomial variables.

Parameters

| | |
|-------------------|--|
| <i>vars</i> | A List of variables. |
| <i>assignment</i> | An array of double with the values of variables in the same order. |

Returns

The index of the corresponding assignment among the possible ones.

5.45.2.4 static int eu.amidst.core.utils.MultinomialIndex.getNumberOfPossibleAssignments (List< Variable > *vars*) [static]

Computes the number of possible assignments for a list of variables

Parameters

| | |
|-------------|------------------------|
| <i>vars</i> | The List of variables. |
|-------------|------------------------|

Returns

A integer indicating the number of possible assignments.

5.45.2.5 static double [] eu.amidst.core.utils.MultinomialIndex.getVariableAssignmentFromIndex (List< Variable > *vars*, int *index*) [static]

Computes the variable assignment located in a given position.

Parameters

| | |
|--------------|---------------------------------|
| <i>vars</i> | A List of variables. |
| <i>index</i> | The position of the Assignment. |

Returns

An array of double with the values of the variables representing the assignment.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/utils/MultinomialIndex.java

5.46 eu.amidst.core.potential.MultivariateGaussian Class Reference

Public Member Functions

- double **density** (double[] values)
- void **setMean** (double[] values)
- double **getMean** ()
- void **setCovariances** (double[][] values)
- double[][] **getCovariances** ()
- double[] **sample** ()

5.46.1 Detailed Description

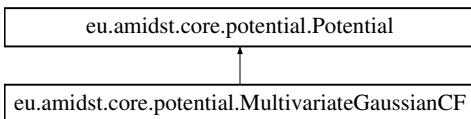
Created by afa on 03/07/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/MultivariateGaussian.java

5.47 eu.amidst.core.potential.MultivariateGaussianCF Class Reference

Inheritance diagram for eu.amidst.core.potential.MultivariateGaussianCF:



Public Member Functions

- void **setParameters** (MultivariateGaussian prob)
- double[][] **getKParameter** ()
- double[] **getHParameter** ()
- double **getGParameter** ()
- MultivariateGaussian **getMG** ()
- void **setVariables** (List variables)
- List **getVariables** ()
- void **combine** (Potential pot)
- void **marginalize** (List variables)

5.47.1 Detailed Description

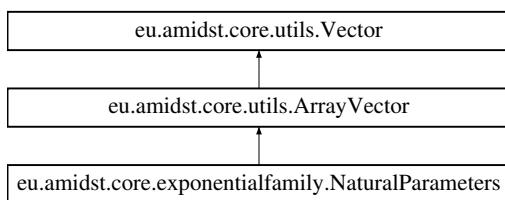
Created by afa on 03/07/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/MultivariateGaussianCF.java

5.48 eu.amidst.core.exponentialfamily.NaturalParameters Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.NaturalParameters:



Public Member Functions

- **NaturalParameters** (int size)
- **NaturalParameters** (double[] vec)

Additional Inherited Members

5.48.1 Detailed Description

Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/NaturalParameters.java

5.49 eu.amidst.core.database.filereaders.NextDynamicDataInstance Class Reference

Public Member Functions

- **NextDynamicDataInstance** (DataRow past, DataRow present, int sequenceID, int timeIDcounter)
- **DynamicDataInstance nextDataInstance_NoTimeID_NoSeq** (DataFileReader reader)
- **DynamicDataInstance nextDataInstance_NoSeq** (DataFileReader reader, Attribute attTimeID)
- **DynamicDataInstance nextDataInstance_NoTimeID** (DataFileReader reader, Attribute attSequenceID)
- **DynamicDataInstance nextDataInstance** (DataFileReader reader, Attribute attSequenceID, Attribute attTimeID)

5.49.1 Detailed Description

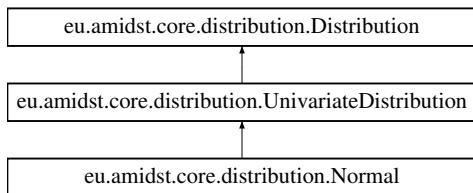
Created by ana@cs.aau.dk on 13/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/NextDynamicDataInstance.java

5.50 eu.amidst.core.distribution.Normal Class Reference

Inheritance diagram for eu.amidst.core.distribution.Normal:



Public Member Functions

- [Normal \(Variable var\)](#)
- double [getMean \(\)](#)
- void [setMean \(double mean\)](#)
- double [getSd \(\)](#)
- void [setSd \(double sd\)](#)
- double [getProbability \(double value\)](#)
- double [getLogProbability \(double value\)](#)

Additional Inherited Members

5.50.1 Detailed Description

This class implements a univariate [Normal](#) distribution.

Author

Antonio Fernández

Version

1.0

Since

2014-11-3

5.50.2 Constructor & Destructor Documentation

5.50.2.1 eu.amidst.core.distribution.Normal.Normal (Variable var)

The class constructor.

Parameters

| | |
|------------|-----------------------------------|
| <i>var</i> | The variable of the distribution. |
|------------|-----------------------------------|

5.50.3 Member Function Documentation**5.50.3.1 double eu.amidst.core.distribution.Normal.getLogProbability (double *value*)**

Computes the logarithm of the density function in a given point.

Parameters

| | |
|--------------|----------------------------|
| <i>value</i> | An value for the variable. |
|--------------|----------------------------|

Returns

A double with the logarithm of the density value.

5.50.3.2 double eu.amidst.core.distribution.Normal.getMean ()

Gets the mean of the distribution.

Returns

A double value with the mean.

5.50.3.3 double eu.amidst.core.distribution.Normal.getProbability (double *value*)

Evaluates the density function in a given point.

Parameters

| | |
|--------------|----------------------------|
| <i>value</i> | An value for the variable. |
|--------------|----------------------------|

Returns

A double with the value of the density.

5.50.3.4 double eu.amidst.core.distribution.Normal.getSd ()

Gets the standard deviation of the distribution.

Returns

A double value with the standar deviation.

5.50.3.5 void eu.amidst.core.distribution.Normal.setMean (double *mean*)

Sets the mean of the distribution.

Parameters

| | |
|-------------------|-----------------------|
| <code>mean</code> | A value for the mean. |
|-------------------|-----------------------|

5.50.3.6 void eu.amidst.core.distribution.Normal.setSd (double `sd`)

Sets the standard deviation of the distribution.

Parameters

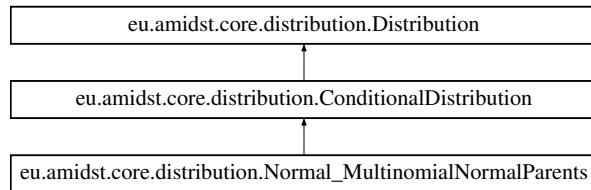
| | |
|-----------------|-------------------------------------|
| <code>sd</code> | A value for the standard deviation. |
|-----------------|-------------------------------------|

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Normal.java

5.51 eu.amidst.core.distribution.Normal_MultinomialNormalParents Class Reference

Inheritance diagram for eu.amidst.core.distribution.Normal_MultinomialNormalParents:



Public Member Functions

- `Normal_MultinomialNormalParents (Variable var, List< Variable > parents)`
- `Normal_NormalParents getNormal_NormalParentsDistribution (Assignment assignment)`
- `Normal_NormalParents getNormal_NormalParentsDistribution (int i)`
- `void setNormal_NormalParentsDistribution (int position, Normal_NormalParents distribution)`
- `void setNormal_NormalParentsDistribution (Assignment assignment, Normal_NormalParents distribution)`
- `double getLogConditionalProbability (Assignment assignment)`
- `List< Variable > getMultinomialParents ()`
- `List< Variable > getNormalParents ()`
- `Normal_NormalParents[] getDistribution ()`

Additional Inherited Members

5.51.1 Detailed Description

This class implements a conditional distribution of a normal variable given a set of multinomial and normal parents.

Author

Antonio Fernández

Version

1.0

Since

2014-11-4

5.51.2 Constructor & Destructor Documentation

5.51.2.1 `eu.amidst.core.distribution.Normal_MultinomialNormalParents.Normal_MultinomialNormalParents (Variable var, List< Variable > parents)`

The class constructor.

Parameters

| | |
|----------------------|-----------------------------------|
| <code>var</code> | The variable of the distribution. |
| <code>parents</code> | The set of parent variables. |

5.51.3 Member Function Documentation

5.51.3.1 `double eu.amidst.core.distribution.Normal_MultinomialNormalParents.getLogConditionalProbability (Assignment assignment)`

Computes the logarithm of the evaluated density function in a point after restricting the distribution to a given parent Assignment.

Parameters

| | |
|-------------------------|---------------|
| <code>assignment</code> | An Assignment |
|-------------------------|---------------|

Returns

A double with the logarithm of the corresponding density value.

5.51.3.2 `Normal_NormalParents eu.amidst.core.distribution.Normal_MultinomialNormalParents.getNormal_NormalParentsDistribution (Assignment assignment)`

Gets a `Normal_NormalParentsDistribution` distribution conditioned to an assignment over a set of `Multinomial` parents. Let X and Y two sets of `Normal` variables, and Z a set of `Multinomial`. Then this method computes $f(X|Y, Z=z)$.

Parameters

| | |
|-------------------------|---|
| <code>assignment</code> | An assignment over a set of parents. For generality reasons, apart from the <code>Multinomial</code> parents, the assignment contains values for the <code>Normal</code> parents as well (although they are not used in this case). |
|-------------------------|---|

Returns

a `Normal_NormalParentsDistribution` distribution conditioned to the assignment given as argument.

5.51.3.3 `void eu.amidst.core.distribution.Normal_MultinomialNormalParents.setNormal_NormalParentsDistribution (int position, Normal_NormalParents distribution)`

Sets a `Normal_NormalParents` distribution to a given position in the array of distributions.

Parameters

| | |
|---------------------|--|
| <i>position</i> | The position in which the distribution is set. |
| <i>distribution</i> | A Normal_NormalParents distribution. |

5.51.3.4 void eu.amidst.core.distribution.Normal_MultinomialNormalParents.setNormal_NormalParentsDistribution (
Assignment *assignment*, **Normal_NormalParents** *distribution*)

Sets a [Normal_NormalParents](#) distribution to the array of distributions in a position determined by an given Assignment. Note that this assignment contains values for the [Normal](#) parents as well (although they are not used in this case).

Parameters

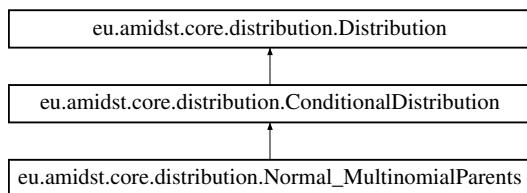
| | |
|---------------------|--|
| <i>assignment</i> | An Assignment for the parents variables. |
| <i>distribution</i> | A Normal_NormalParents distribution. |

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Normal_MultinomialNormalParents.java

5.52 eu.amidst.core.distribution.Normal_MultinomialParents Class Reference

Inheritance diagram for eu.amidst.core.distribution.Normal_MultinomialParents:



Public Member Functions

- **Normal_MultinomialParents** ([Variable](#) *var*, [List< Variable >](#) *parents*)
- **Normal** [getNormal](#) (*int* *position*)
- **Normal** [getNormal](#) ([Assignment](#) *parentsAssignment*)
- void [setNormal](#) (*int* *position*, [Normal](#) *normalDistribution*)
- void [setNormal](#) ([Assignment](#) *parentsAssignment*, [Normal](#) *normalDistribution*)
- double [getLogConditionalProbability](#) ([Assignment](#) *assignment*)

Additional Inherited Members

5.52.1 Detailed Description

This class implements a conditional distribution of a normal variable given a set of multinomial parents.

Author

Antonio Fernández

Version

1.0

Since

2014-11-4

5.52.2 Constructor & Destructor Documentation

5.52.2.1 `eu.amidst.core.distribution.Normal_MultinomialParents.Normal_MultinomialParents (Variable var, List< Variable > parents)`

The class constructor.

Parameters

| | |
|----------------------|-----------------------------------|
| <code>var</code> | The variable of the distribution. |
| <code>parents</code> | The set of parent variables. |

5.52.3 Member Function Documentation

5.52.3.1 `double eu.amidst.core.distribution.Normal_MultinomialParents.getLogConditionalProbability (Assignment assignment)`

Computes the logarithm of the evaluated density function in a point after conditioning the distribution to a given parent Assignment.

Parameters

| | |
|-------------------------|--------------------------------|
| <code>assignment</code> | An Assignment for the parents. |
|-------------------------|--------------------------------|

Returns

A double with the logarithm of the corresponding density value.

5.52.3.2 `Normal eu.amidst.core.distribution.Normal_MultinomialParents.getNormal (Assignment parentsAssignment)`

Gets the corresponding univariate normal distribution after conditioning the distribution to a multinomial parent assignment.

Parameters

| | |
|--------------------------------|--------------------------------|
| <code>parentsAssignment</code> | An Assignment for the parents. |
|--------------------------------|--------------------------------|

Returns

A `Normal` object with the univariate distribution.

5.52.3.3 `void eu.amidst.core.distribution.Normal_MultinomialParents.setNormal (int position, Normal normalDistribution)`

Sets a `Normal` distribution in a given position in the array of distributions.

Parameters

| | |
|--------------------------------------|--|
| <i>position</i> | The position in which the distribution is set. |
| <i>normal</i> <i>Distribution</i> | The Normal distribution to be set. |

5.52.3.4 void eu.amidst.core.distribution.Normal_MultinomialParents.setNormal ([Assignment parentsAssignment](#), [Normal normalDistribution](#))

Sets a [Multinomial](#) distribution in a position in the array of distributions determined by a given parents assignment.

Parameters

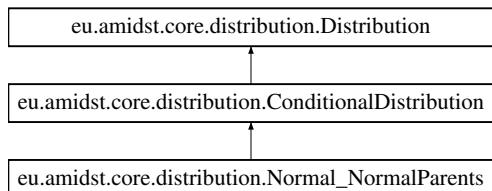
| | |
|--------------------------------------|--|
| <i>parents</i> <i>Assignment</i> | An Assignment for the parents. |
| <i>normal</i> <i>Distribution</i> | The Normal distribution to be set. |

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Normal_MultinomialParents.java

5.53 eu.amidst.core.distribution.Normal_NormalParents Class Reference

Inheritance diagram for eu.amidst.core.distribution.Normal_NormalParents:



Public Member Functions

- [Normal_NormalParents \(Variable var, List< Variable > parents\)](#)
- double [getIntercept \(\)](#)
- void [setIntercept \(double intercept\)](#)
- double[] [getCoeffParents \(\)](#)
- void [setCoeffParents \(double\[\] coeffParents\)](#)
- double [getSd \(\)](#)
- void [setSd \(double sd\)](#)
- [Normal getUnivariateNormal \(Assignment parentsAssignment\)](#)
- double [getLogConditionalProbability \(Assignment assignment\)](#)

Additional Inherited Members

5.53.1 Detailed Description

This class implements a Conditional Linear Gaussian distribution, i.e. a distribution of a normal variable with continuous normal parents.

Author

Antonio Fernández

Version

1.0

Since

2014-11-4

5.53.2 Constructor & Destructor Documentation

5.53.2.1 `eu.amidst.core.distribution.Normal_NormalParents.Normal_NormalParents (Variable var, List<Variable> parents)`

The class constructor.

Parameters

| | |
|----------------------|-------------------------------------|
| <code>var</code> | The variable of the distribution. |
| <code>parents</code> | The set of parents of the variable. |

5.53.3 Member Function Documentation

5.53.3.1 `double [] eu.amidst.core.distribution.Normal_NormalParents.getCoeffParents ()`

Gets the coefficients for the parent variables.

Returns

An array of `double` with the coefficients.

5.53.3.2 `double eu.amidst.core.distribution.Normal_NormalParents.getIntercept ()`

Gets the intercept of the distribution.

Returns

A `double` value with the intercept.

5.53.3.3 `double eu.amidst.core.distribution.Normal_NormalParents.getLogConditionalProbability (Assignment assignment)`

Computes the logarithm of the evaluated density function in a point after conditioning the distribution to a given parent Assignment.

Parameters

| | |
|-------------------------|---------------|
| <code>assignment</code> | An Assignment |
|-------------------------|---------------|

Returns

A `double` with the logarithm of the corresponding density value.

5.53.3.4 double eu.amidst.core.distribution.Normal_NormalParents.getSd()

Gets the standard deviation of the variable.

Returns

A double value with the standard deviation.

5.53.3.5 Normal eu.amidst.core.distribution.Normal_NormalParents.getUnivariateNormal(Assignment parentsAssignment)

Gets the corresponding univariate normal distribution after conditioning the distribution to a parent assignment.

Parameters

| | |
|--------------------------------|--------------------------------|
| <i>parents</i> ↪ Assignment | An Assignment for the parents. |
|--------------------------------|--------------------------------|

Returns

A [Normal](#) object with the univariate distribution.

5.53.3.6 void eu.amidst.core.distribution.Normal_NormalParents.setCoeffParents(double[] coeffParents)

Sets the coefficients of the distribution

Parameters

| | |
|---------------------|--|
| <i>coeffParents</i> | An array of double with the coefficients, one for each parent. |
|---------------------|--|

5.53.3.7 void eu.amidst.core.distribution.Normal_NormalParents.setIntercept(double intercept)

Sets the intercept of the distribution.

Parameters

| | |
|------------------|------------------------------------|
| <i>intercept</i> | A double value with the intercept. |
|------------------|------------------------------------|

5.53.3.8 void eu.amidst.core.distribution.Normal_NormalParents.setSd(double sd)

Sets the standard deviation of the variable.

Parameters

| | |
|-----------|---|
| <i>sd</i> | A double value with the standard deviation. |
|-----------|---|

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/Normal_NormalParents.java

5.54 eu.amidst.core.huginlink.Others Class Reference

5.54.1 Detailed Description

Created by afa on 18/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/huginlink/Others.java

5.55 eu.amidst.core.modelstructure.ParentSet Class Reference

Public Member Functions

- void **addParent** ([Variable](#) var)
- void **removeParent** ([Variable](#) var)
- List< [Variable](#) > **getParents** ()
- int **getNumberOfParents** ()
- void **blockParents** ()

Static Public Member Functions

- static [ParentSet](#) **newParentSet** ()

5.55.1 Detailed Description

Created by afa on 02/07/14.

5.55.2 Member Function Documentation

5.55.2.1 void eu.amidst.core.modelstructure.ParentSet.blockParents ()

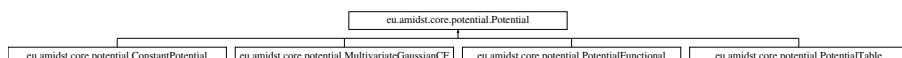
Is an ArrayList pointer to an ArrayList unmodifiable object still unmodifiable? I guess so right?

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/modelstructure/ParentSet.java

5.56 eu.amidst.core.potential.Potential Interface Reference

Inheritance diagram for eu.amidst.core.potential.Potential:



Public Member Functions

- void **setVariables** (List variables)
- List **getVariables** ()
- void **combine** ([Potential](#) pot)
- void **marginalize** (List variables)

5.56.1 Detailed Description

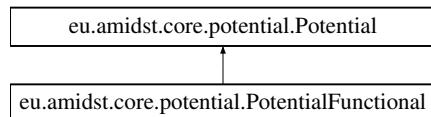
Created by afa on 03/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/Potential.java

5.57 eu.amidst.core.potential.PotentialFunctional Class Reference

Inheritance diagram for eu.amidst.core.potential.PotentialFunctional:



Public Member Functions

- void **setVariables** (List variables)
- List **getVariables** ()
- void **combine** (Potential pot)
- void **marginalize** (List variables)

5.57.1 Detailed Description

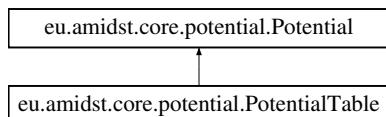
Created by afa on 03/07/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/PotentialFunctional.java

5.58 eu.amidst.core.potential.PotentialTable Class Reference

Inheritance diagram for eu.amidst.core.potential.PotentialTable:



Public Member Functions

- PotentialTable (int nstates)
- void **setValues** (double[] values)
- double[] **getValues** ()
- void **setVariables** (List variables)
- List **getVariables** ()
- void **combine** (Potential pot)
- void **marginalize** (List variables)
- void **normalize** ()

5.58.1 Detailed Description

Created by afa on 03/07/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/potential/PotentialTable.java

5.59 eu.amidst.core.database.dynamics.SequenceDataStream Interface Reference

Public Member Functions

- [Attributes `getDynamicAttributes \(\)`](#)
- [int `getNumTimeStepsBack \(\)`](#)
- [boolean `hasMoreData \(\)`](#)
- [DynamicDataInstance `nextSequenceData \(\)`](#)
- [void `reset \(\)`](#)
- [boolean `isResetable \(\)`](#)

5.59.1 Detailed Description

Created by afa on 03/07/14.

The documentation for this interface was generated from the following file:

- [/Users/ana/Documents/core/src/main/java/eu/amidst/core/database/dynamics/SequenceDataStream.java](#)

5.60 eu.amidst.core.database.dynamics.readers.SequenceDataStreamReaderFromFile Class Reference

Public Member Functions

- [SequenceDataStreamReaderFromFile `\(String fileName\)`](#)
- [SequenceDataStream `getDataStream \(\)`](#)

5.60.1 Detailed Description

Created by andresmasegosa on 27/08/14.

The documentation for this class was generated from the following file:

- [/Users/ana/Documents/core/src/main/java/eu/amidst/core/database/dynamics/readers/SequenceDataStreamReaderFromFile.java](#)

5.61 eu.amidst.core.database.dynamics.SequenceStreamWindow Interface Reference

Public Member Functions

- [Attributes `getDynamicAttributes \(\)`](#)
- [int `getWindowSize \(\)`](#)
- [boolean `hasMoreData \(\)`](#)
- [void `loadNextWindow \(\)`](#)
- [DynamicDataInstance `getSequenceData \(int indexInWindow\)`](#)
- [boolean `isResetable \(\)`](#)
- [void `reset \(\)`](#)

5.61.1 Detailed Description

Created by afa on 03/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/dynamics/SequenceStreamWindow.java

5.62 eu.amidst.core.variables.StateSpaceType Enum Reference

Static Public Member Functions

- static [StateSpaceType parseKind](#) (String s)

Public Attributes

- **REAL**

5.62.1 Detailed Description

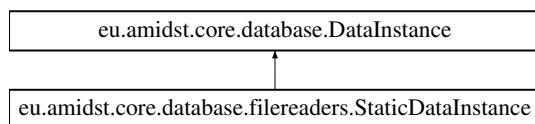
Created by sigveh on 10/20/14.

The documentation for this enum was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/StateSpaceType.java

5.63 eu.amidst.core.database.filereaders.StaticDataInstance Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.StaticDataInstance:



Public Member Functions

- **StaticDataInstance** ([DataRow](#) dataRow_)
- double **getValue** ([Variable](#) var)
- int **getSequenceID** ()
- int **getTimeID** ()

5.63.1 Detailed Description

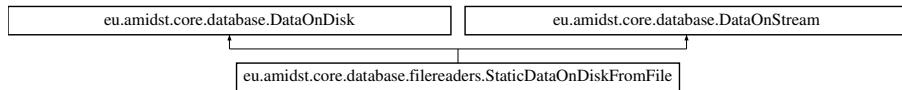
Created by andresmasegosa on 11/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/StaticDataInstance.java

5.64 eu.amidst.core.database.filereaders.StaticDataOnDiskFromFile Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.StaticDataOnDiskFromFile:



Public Member Functions

- **StaticDataOnDiskFromFile** ([DataFileReader](#) reader)
- **DataInstance** [nextDataInstance](#) ()
- boolean [hasMoreDataInstances](#) ()
- **Attributes** [getAttributes](#) ()
- void [restart](#) ()

5.64.1 Detailed Description

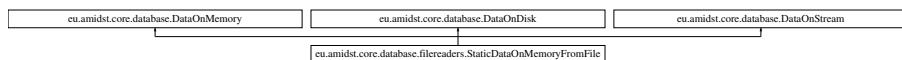
Created by andresmasegosa on 11/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/StaticDataOnDiskFromFile.java

5.65 eu.amidst.core.database.filereaders.StaticDataOnMemoryFromFile Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.StaticDataOnMemoryFromFile:



Public Member Functions

- **StaticDataOnMemoryFromFile** ([DataFileReader](#) reader)
- int [getNumberOfDataInstances](#) ()
- **DataInstance** [getDataInstance](#) (int i)
- **DataInstance** [nextDataInstance](#) ()
- boolean [hasMoreDataInstances](#) ()
- void [restart](#) ()
- **Attributes** [getAttributes](#) ()

5.65.1 Detailed Description

Created by andresmasegosa on 11/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/StaticDataOnMemoryFromfile.java

5.66 eu.amidst.core.variables.StaticVariables Class Reference

Public Member Functions

- **StaticVariables** (**Attributes** atts)
- **StaticVariables** (**Attributes** atts, **HashMap< Attribute, DistType >** typeDists)
- **Variable addHiddenVariable** (**VariableBuilder** builder)
- **List< Variable > getVariables** ()
- **Variable getVariable** (int varID)
- **Variable getVariable** (String name)
- **int getNumberOfVars** ()

5.66.1 Detailed Description

Created by afa on 02/07/14.

5.66.2 Constructor & Destructor Documentation

5.66.2.1 eu.amidst.core.variables.StaticVariables (Attributes atts)

Constructor where the distribution type of random variables is initialized by default.

5.66.2.2 eu.amidst.core.variables.StaticVariables (Attributes atts, **HashMap< Attribute, DistType >** typeDists)

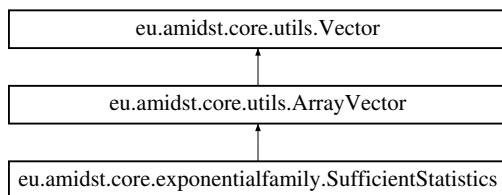
Constructor where the distribution type of random variables is provided as an argument.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/StaticVariables.java

5.67 eu.amidst.core.exponentialfamily.SufficientStatistics Class Reference

Inheritance diagram for eu.amidst.core.exponentialfamily.SufficientStatistics:



Public Member Functions

- **SufficientStatistics** (int size)
- **SufficientStatistics** (double[] vec)

Additional Inherited Members

5.67.1 Detailed Description

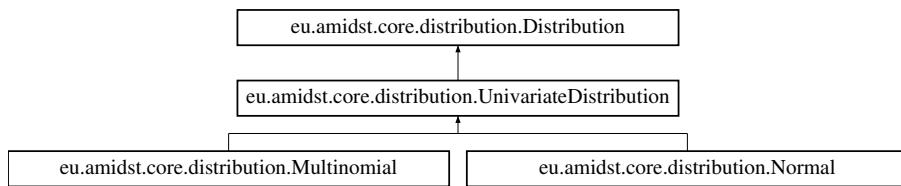
Created by andresmasegosa on 12/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/exponentialfamily/SufficientStatistics.java

5.68 eu.amidst.core.distribution.UnivariateDistribution Class Reference

Inheritance diagram for eu.amidst.core.distribution.UnivariateDistribution:



Public Member Functions

- double `getProbability` (double value)
- abstract double `getLogProbability` (double value)

Additional Inherited Members

5.68.1 Detailed Description

This interface generalizes the set of univariate distributions.

Author

Antonio Fernández

Version

1.0

Since

2014-11-3

5.68.2 Member Function Documentation

5.68.2.1 abstract double eu.amidst.core.distribution.UnivariateDistribution.getLogProbability (double value) [abstract]

Evaluates the distribution in a given point.

Parameters

| | |
|--------------------|----------------------------|
| <code>value</code> | The point to be evaluated. |
|--------------------|----------------------------|

Returns

A double value with the logarithm of the evaluated distribution.

5.68.2.2 double eu.amidst.core.distribution.UnivariateDistribution.getProbability (double value)

Evaluates the distribution in a given point.

Parameters

| | |
|--------------------|----------------------------|
| <code>value</code> | The point to be evaluated. |
|--------------------|----------------------------|

Returns

A double value with the evaluated distribution.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/distribution/UnivariateDistribution.java

5.69 eu.amidst.core.utils.Utils Class Reference**Static Public Member Functions**

- static double **getMissingValue** ()
- static boolean **isMissing** (double val)
- static void **accumulatedSumVectors** (double[] a, double[] b)

5.69.1 Detailed Description

Created by andresmasegosa on 28/08/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/utils/Utils.java

5.70 eu.amidst.core.variables.Variable Interface Reference**Public Member Functions**

- String **getName** ()
- int **getVarID** ()
- boolean **isObservable** ()
- int **getNumberOfStates** ()
- **StateSpaceType** **getStateSpaceType** ()
- **DistType** **getDistributionType** ()
- boolean **isTemporalClone** ()
- **Attribute** **getAttribute** ()

5.70.1 Detailed Description

Created by afa on 02/07/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/Variable.java

5.71 eu.amidst.core.variables.VariableBuilder Class Reference

Public Member Functions

- **VariableBuilder** ([Attribute](#) att)
- **VariableBuilder** ([Attribute](#) att, [DistType](#) typeDist)

Static Public Member Functions

- static String **getName** ()
- static boolean **isObservable** ()
- static int **getNumberOfStates** ()
- static [StateSpaceType](#) **getStateSpaceType** ()
- static [DistType](#) **getDistributionType** ()
- static [Attribute](#) **getAttribute** ()

5.71.1 Detailed Description

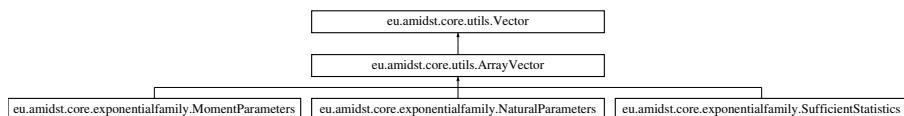
Created by andresmasegosa on 04/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/variables/VariableBuilder.java

5.72 eu.amidst.core.utils.Vector Interface Reference

Inheritance diagram for eu.amidst.core.utils.Vector:



Public Member Functions

- double **get** (int i)
- void **set** (int i, double val)
- int **size** ()
- default void **dotProduct** ([Vector](#) vec)

Static Public Member Functions

- static double **dotProduct** ([Vector](#) vec1, [Vector](#) vec2)

5.72.1 Detailed Description

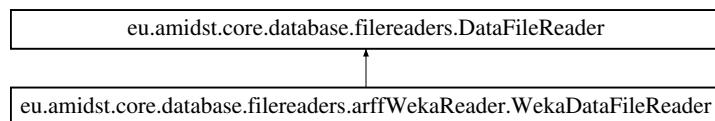
Created by andresmasegosa on 12/11/14.

The documentation for this interface was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/utils/Vector.java

5.73 eu.amidst.core.database.filereaders.arffWekaReader.WekaDataFileReader Class Reference

Inheritance diagram for eu.amidst.core.database.filereaders.arffWekaReader.WekaDataFileReader:



Public Member Functions

- **WekaDataFileReader** (String s)
- **Attributes** **getAttributes** ()
- **DataRow** **nextDataRow** ()
- boolean **hasMoreDataRows** ()
- void **reset** ()
- boolean **doesItReadThisFileExtension** (String fileExtension)

5.73.1 Detailed Description

Created by ana@cs.aau.dk on 14/11/14.

The documentation for this class was generated from the following file:

- /Users/ana/Documents/core/src/main/java/eu/amidst/core/database/filereaders/arffWekaReader/WekaDataFileReader.java