Optimal Partition

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Contents

Chapter 1

Main Page

This program is a toolbox to solve special versions of the Set Partitioning Problem, that is the combinatorial optimisation of a decomposable objective over a set of feasible partitions (defined according to specific algebraic structures: e.g., hierachies, sets of intervals, graphs). The objectives are mainly based on information theory, in the perspective of multilevel analysis of large-scale datasets, and the algorithms are based on dynamic programming. For details regarding the formal grounds of this work, please refer to:

Robin Lamarche-Perrin, Yves Demazeau and Jean-Marc Vincent. A Generic Set Partitioning Algorithm with Applications to Hierarchical and Ordered Sets. Technical Report 105/2014, Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany, May 2014.

http://www.mis.mpg.de/publications/preprints/2014/prepr2014-105.html

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 5

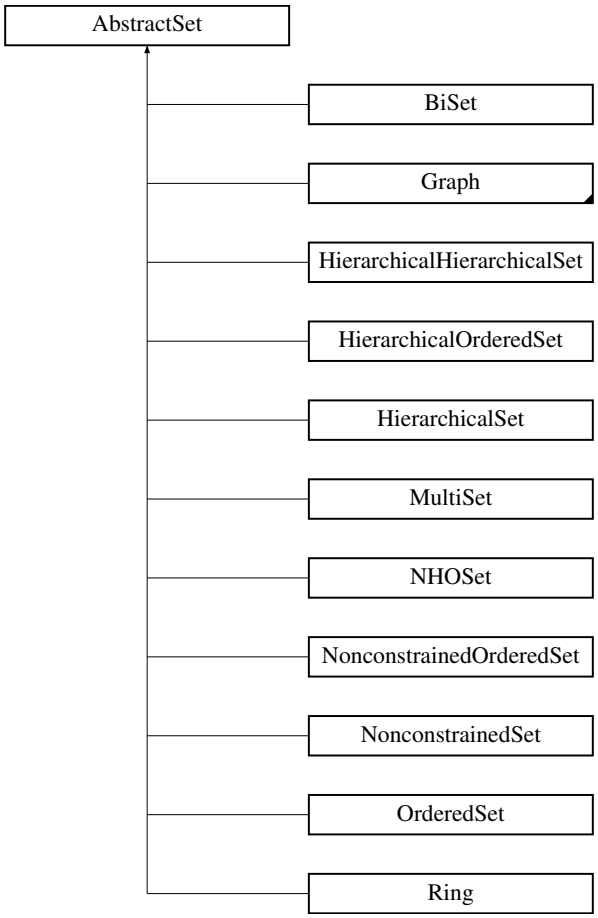
Class Documentation

5.1 AbstractSet Class Reference

Abstract class defining a set of elements that one wants to partition while optimising some (decomposable) objective and preserving some algebraic constraints (set of feasible parts)

`#include <abstract_set.hpp>`

Inheritance diagram for AbstractSet:



Public Member Functions

- virtual ~AbstractSet ()

  The objective that one wants to optimise (assumed to be decomposable: the objective of a partition is function of the objectives of its parts)
- virtual void setRandom ()=0

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- virtual void buildDataStructure ()=0

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- virtual void setObjectiveFunction (ObjectiveFunction *objective)=0

  Set the objective that one wants to optimise.
- virtual void print ()=0

  Print the set and its algebraic constraints.
- virtual void computeObjectiveValues ()=0

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- virtual void normalizeObjectiveValues ()=0

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- virtual void printObjectiveValues ()=0

  Print the value of the objective function for each feasible part.
- virtual void computeOptimalPartition (double parameter)=0

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- virtual Partition * getOptimalPartition (double parameter)=0

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- virtual void printOptimalPartition (double parameter)=0

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- PartitionList * getOptimalPartitionList (double threshold)

  Compute and return a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)
- void printOptimalPartitionList (double threshold)

  Compute and print a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)
- void printOptimalPartitionListInCSV (double threshold, Dataset *data, int dim, std::string fileName)

  Compute and print in a CSV file a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)

Public Attributes

- ObjectiveFunction * **objective**

5.1.1 Detailed Description

Abstract class defining a set of elements that one wants to partition while optimising some (decomposable) objective and preserving some algebraic constraints (set of feasible parts)

5.1.2 Constructor & Destructor Documentation

5.1.2.1 AbstractSet::~AbstractSet ( ) [virtual]

The objective that one wants to optimise (assumed to be decomposable: the objective of a partition is function of the objectives of its parts)

Destructor

5.1.3 Member Function Documentation

5.1.3.1 virtual void AbstractSet::computeOptimalPartition (double *parameter*) [pure virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implemented in Graph, MultiSet, BiSet, NonconstrainedSet, Ring, NHOSet, HierarchicalHierarchicalSet, OrderedSet, NonconstrainedOrderedSet, HierarchicalOrderedSet, and HierarchicalSet.

5.1.3.2 virtual Partition* AbstractSet::getOptimalPartition (double *parameter*) [pure virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implemented in Graph, MultiSet, BiSet, NonconstrainedSet, Ring, NHOSet, HierarchicalHierarchicalSet, OrderedSet, NonconstrainedOrderedSet, HierarchicalOrderedSet, and HierarchicalSet.

5.1.3.3 PartitionList * AbstractSet::getOptimalPartitionList (double *threshold*)

Compute and return a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)

Parameters

threshold	: The minimal distance between two successive parameters giving birth to two different partitions

Returns

: The resulting list of optimal partitions

5.1.3.4 virtual void AbstractSet::printOptimalPartition (double *parameter*) [pure virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implemented in Graph, MultiSet, BiSet, NonconstrainedSet, Ring, NHOSet, HierarchicalHierarchicalSet, OrderedSet, NonconstrainedOrderedSet, HierarchicalOrderedSet, and HierarchicalSet.

5.1.3.5 void AbstractSet::printOptimalPartitionList (double *threshold*)

Compute and print a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)

Parameters

threshold	: The minimal distance between two successive parameters giving birth to two different partitions

5.1.3.6 void AbstractSet::printOptimalPartitionListInCSV (double *threshold,* **Dataset** ∗ *data,* int *dim,* std::string *fileName*)

Compute and print in a CSV file a list of partitions that fit with the algebraic constraints and that optimises the objective function that has been specified, while the parameter of the objective function varies on a proper ranged (defined by the objective itself)

Parameters

threshold	: The minimal distance between two successive parameters giving birth to two different partitions

5.1.3.7 virtual void AbstractSet::setObjectiveFunction (**ObjectiveFunction** ∗ *objective*) [pure virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implemented in MultiSet, Graph, BiSet, Ring, NonconstrainedSet, NHOSet, HierarchicalHierarchicalSet, OrderedSet, NonconstrainedOrderedSet, HierarchicalOrderedSet, and HierarchicalSet.

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

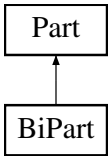
- /home/lamarche/programming/optimal_partition/src/abstract_set.hpp
- /home/lamarche/programming/optimal_partition/src/abstract_set.cpp

5.2 BiPart Class Reference

A bi-part is a subset of a bi-dimensional set of elements (individuals)

`#include <partition.hpp>`

Inheritance diagram for BiPart:



Public Member Functions

- **BiPart** (Part ∗part1, Part ∗part2, ObjectiveValue ∗value=0)
- **BiPart** (BiPart ∗biPart)
- bool **equal** (Part ∗p)
- void **print** (bool endl=false)
- int **printSize** ()

Public Attributes

- Part ∗ **firstPart**
- Part ∗ **secondPart**

5.2.1 Detailed Description

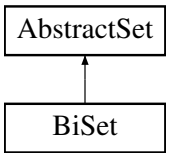
A bi-part is a subset of a bi-dimensional set of elements (individuals)

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

- /home/lamarche/programming/optimal_partition/src/partition.hpp
- /home/lamarche/programming/optimal_partition/src/partition.cpp

5.3 BiSet Class Reference

Inheritance diagram for BiSet:



Public Member Functions

- **BiSet** (UniSet ∗uniSet1, UniSet ∗uniSet2)
- void **initReached** ()
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction ∗m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction ∗objective) should have been called first)
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)

- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- UniSet * **uniSet1**
- UniSet * **uniSet2**
- int **biSubsetNumber**
- int **atomicBiSubsetNumber**
- BiSubset * **firstBiSubset**
- BiSubset ** **biSubsetArray**

5.3.1 Member Function Documentation

5.3.1.1 void BiSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.3.1.2 Partition * BiSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.3.1.3 void BiSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.3.1.4 void BiSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/bi_set.hpp
- /home/lamarche/programming/optimal_partition/src/bi_set.cpp

5.4 BiSubset Class Reference

Public Member Functions

- **BiSubset** (UniSubset *uniSubset1, UniSubset *uniSubset2)
- void **print** ()
- void **printIndexSet** (bool endl=false)
- void **addBiSubsetSet** (BiSubsetSet *biSubsetSet)
- void **setObjectiveFunction** (ObjectiveFunction *m)
- void **buildDataStructure** ()
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue *maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition *partition)

Public Attributes

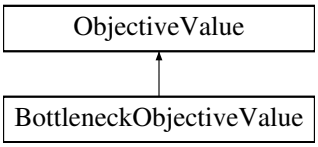
- UniSubset * **uniSubset1**
- UniSubset * **uniSubset2**
- int **num**
- bool **isAtomic**
- bool **reached**
- BiSubsetSetSet * **biSubsetSetSet**
- BiSet * **biSet**
- ObjectiveFunction * **objective**
- ObjectiveValue * **value**
- double **optimalValue**
- BiSubsetSet * **optimalCut**

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

- /home/lamarche/programming/optimal_partition/src/bi_set.hpp
- /home/lamarche/programming/optimal_partition/src/bi_set.cpp

5.5 BottleneckObjectiveValue Class Reference

Inheritance diagram for BottleneckObjectiveValue:



Public Member Functions

- **BottleneckObjectiveValue** (InformationBottleneck *objective, int index=-1)
- void **add** (ObjectiveValue *value)
- void **compute** ()
- void **compute** (ObjectiveValue *value1, ObjectiveValue *value2)
- void **compute** (ObjectiveValueSet *valueSet)
- void **normalize** (ObjectiveValue *q)
- void **print** (bool verbose=true)
- double **getValue** (double param)

Public Attributes

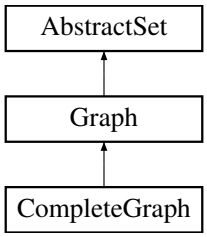
- int **index**
- double **pk**
- double * **pkj**
- double * **pj**
- double **lki**
- double **lkj**

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

- /home/lamarche/programming/optimal_partition/src/information_bottleneck.hpp
- /home/lamarche/programming/optimal_partition/src/information_bottleneck.cpp

5.6 CompleteGraph Class Reference

Inheritance diagram for CompleteGraph:



Public Member Functions

- **CompleteGraph** (int vNum)

Additional Inherited Members

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp

5.7 DataPointStruct Struct Reference

Public Attributes

- std::vector< int > **parameters**
- float **time**
- int **memory**

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

- /home/lamarche/programming/optimal_partition/src/timer.hpp

5.8 Dataset Class Reference

Public Member Functions

- void **print** ()
- void **buildDataset** ()
- void **initValues** (double v=0)
- void **initRefValues** (double v=0)
- void **addLabel1** (std::string str)
- void **addLabel2** (std::string str)
- std::string **getLabel1** (int i)
- std::string **getLabel2** (int j)
- int **getIndex1** (std::string s1)
- int **getIndex2** (std::string s2)
- double **getValue** (int i, int j)
- double **getRefValue** (int i, int j)
- double **getValue** (std::string s1, std::string s2)
- double **getRefValue** (std::string s1, std::string s2)
- void **setValue** (int i, int j, double v)
- void **setRefValue** (int i, int j, double v)
- void **setValue** (std::string s1, std::string s2, double v)
- void **setRefValue** (std::string s1, std::string s2, double v)
- void **incrementValue** (int i, int j)
- void **incrementRefValue** (int i, int j)
- void **incrementValue** (std::string s1, std::string s2)
- void **incrementRefValue** (std::string s1, std::string s2)
- double * **getValues1** (std::string s2)
- double * **getValues2** (std::string s1)
- double * **getRefValues1** (std::string s2)
- double * **getRefValues2** (std::string s1)
- double * **getValues** (bool order=true)
- double * **getRefValues** (bool order=true)

Public Attributes

- int **size1**
- int **size2**
- std::map< std::string, int > * **indices1**
- std::map< std::string, int > * **indices2**
- std::map< int, std::string > * **labels1**
- std::map< int, std::string > * **labels2**
- double * **values**
- double * **refValues**

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

- /home/lamarche/programming/optimal_partition/src/dataset.hpp
- /home/lamarche/programming/optimal_partition/src/dataset.cpp

5.9 Datatree Class Reference

Public Member Functions

- **Datatree** (Datatree &tree)
- **Datatree** (int vertex=-1)
- void **setObjectiveFunction** (ObjectiveFunction *objective)
- std::string **toString** ()
- Vertices * **getAllVertices** ()
- Datatree * **addChild** (int v, bool print=true)
- Datatree * **findChild** (int v)
- Datatree * **findOrAddChild** (int v, bool print=true)
- void **addBipartition** (Datatree *n1, Datatree *n2)
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue *maxObjectiveValue=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- Partition * **getOptimalPartition** (double parameter)
- void **print** (bool verbose=false)
- void **printVertices** (bool endl=true)
- PartSet * **getParts** ()
- void **printParts** ()
- PartitionList * **getAllPartitions** ()
- int **printPartitions** (bool print=true)

Public Attributes

- int **size**
- int **vertex**
- bool **wholeSet**
- ObjectiveFunction * **objective**
- Datatree * **parent**
- Datatree * **complement**
- TreesList * **complementList**
- TreesSet * **children**
- ObjectiveValue * **value**

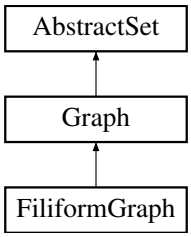
- BipartitionsSet * **bipartitions**
- double **optimalValue**
- Bipartition * **optimalBipartition**
- bool **optimized**

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

- /home/lamarche/programming/optimal_partition/src/datatree.hpp
- /home/lamarche/programming/optimal_partition/src/datatree.cpp

5.10 FiliformGraph Class Reference

Inheritance diagram for FiliformGraph:



Public Member Functions

- **FiliformGraph** (int vNum)

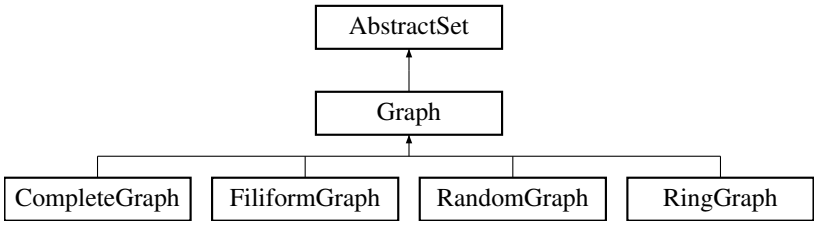
Additional Inherited Members

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.11 Graph Class Reference

Inheritance diagram for Graph:



Public Member Functions

- **Graph** (int size)
- void setRandom ()

Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)

- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void **addEdge** (int v1, int v2)
- void **buildFromBinary** (int index)
- bool **areAdjacent** (int v1, int v2)
- bool **areAdjacent** (int v1, Vertices *v2)
- bool **areAdjacent** (Vertices *v1, int v2)
- bool **areAdjacent** (Vertices *v1, Vertices *v2)
- bool **areAdjacent** (int v1, VVertices *v2)
- bool **areAdjacent** (VVertices *v1, int v2)
- bool **areAdjacent** (VVertices *v1, VVertices *v2)
- Vertices * **getAdjacentVertices** (int v, int vMax=-1)
- void **printVertices** (Vertices *V)
- bool **isConnected** ()
- bool **isConnected** (Vertices *V)
- void **printDataStructure** (bool verbose=true)
- PartSet * **getParts** ()
- void **printParts** ()
- int **printPartitions** (bool print=true)
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void **buildDataStructureWithSlyce** ()
- void **slyce** (VVertices *R, VVertices *F, int m)
- void **enumerateSubsets** (VVertices *R, VVertices *F, int m, int n, VVertices *T, int q, int r)
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **size**
- Vertices ** **adjacencySets**
- GraphComponent ** **graphComponents**
- GraphComponentSet * **graphComponentSet**
- bool * **reachedVertices**
- ObjectiveValue * **value**

5.11.1 Member Function Documentation

5.11.1.1 void Graph::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.11.1.2 Partition * Graph::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.11.1.3 void Graph::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.11.1.4 void Graph::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.12 GraphComponent Class Reference

Public Member Functions

- **GraphComponent** (Graph ∗graph)
- void **setVertices** (std::list< int > ∗vertexList)
- void **printDataStructure** (bool verbose=true)
- void **buildDataStructure** ()
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** ()
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- Partition ∗ **getOptimalPartition** (double parameter)

Public Attributes

- int **size**
- int ∗ **vertices**
- std::map< int, int > ∗ **order**
- Graph ∗ **graph**
- Datatree ∗ **datatree**

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.13 HHNode Class Reference

Public Member Functions

- **HHNode** (HNode ∗node1, HNode ∗node2)
- void **addChild1** (HHNode ∗node)
- void **addChild2** (HHNode ∗node)
- void **setObjectiveFunction** (ObjectiveFunction ∗m)
- void **print** ()
- void **printIndices** (bool endl=false)
- void **buildDataStructure** ()
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue ∗maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition ∗partition)

Public Attributes

- HNode ∗ **node1**
- HNode ∗ **node2**
- HHNodeSet ∗ **children1**
- HHNodeSet ∗ **children2**
- ObjectiveFunction ∗ **objective**
- ObjectiveValue ∗ **value**

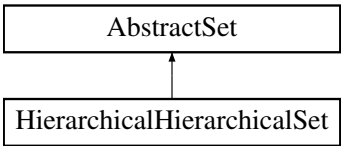
- double **optimalValue**
- int **optimalCut**

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

- /home/lamarche/programming/optimal_partition/src/hierarchical_hierarchical_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_hierarchical_set.cpp

5.14 HierarchicalHierarchicalSet Class Reference

Inheritance diagram for HierarchicalHierarchicalSet:



Public Member Functions

- **HierarchicalHierarchicalSet** (HNode ∗hierarchy1, HNode ∗hierarchy2)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction ∗m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction ∗objective) should have been called first)
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition ∗ getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- HNode * **hierarchy1**
- HNode * **hierarchy2**
- HHNode * **hyperarchy**

5.14.1 Member Function Documentation

5.14.1.1 void HierarchicalHierarchicalSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.14.1.2 Partition * HierarchicalHierarchicalSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.14.1.3 void HierarchicalHierarchicalSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.14.1.4 void HierarchicalHierarchicalSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

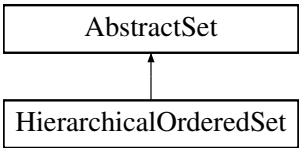
Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/hierarchical_hierarchical_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_hierarchical_set.cpp

5.15 HierarchicalOrderedSet Class Reference

Inheritance diagram for HierarchicalOrderedSet:



Public Member Functions

- **HierarchicalOrderedSet** (HONode *hierarchy, int size)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **size**
- HONode * **hierarchy**

5.15.1 Member Function Documentation

5.15.1.1 void HierarchicalOrderedSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.15.1.2 Partition * HierarchicalOrderedSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.15.1.3 void HierarchicalOrderedSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.15.1.4 void HierarchicalOrderedSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

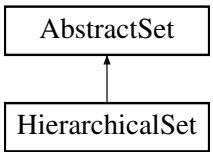
Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/hierarchical_ordered_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_ordered_set.cpp

5.16 HierarchicalSet Class Reference

Inheritance diagram for HierarchicalSet:



Public Member Functions

- **HierarchicalSet** (HNode *hierarchy)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- HNode * **hierarchy**

5.16.1 Member Function Documentation

5.16.1.1 void HierarchicalSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.16.1.2 Partition * HierarchicalSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.16.1.3 void HierarchicalSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.16.1.4 void HierarchicalSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

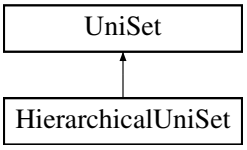
- /home/lamarche/programming/optimal_partition/src/hierarchical_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_set.cpp

5.17 HierarchicalUniSet Class Reference

A uni-dimensional set of elements structured according to a complete binary hierarchy, and such that the feasible subsets are all the nodes of the hierarchy.

`#include <uni_set.hpp>`

Inheritance diagram for HierarchicalUniSet:



Public Member Functions

- HierarchicalUniSet (int depth)

  Depth of the complete binary hierarchy.

Public Attributes

- int **depth**

Additional Inherited Members

5.17.1 Detailed Description

A uni-dimensional set of elements structured according to a complete binary hierarchy, and such that the feasible subsets are all the nodes of the hierarchy.

5.17.2 Constructor & Destructor Documentation

5.17.2.1 HierarchicalUniSet::HierarchicalUniSet (int *depth*)

Depth of the complete binary hierarchy.

Constructor

Parameters

size	: Depth of the complete binary hierarchy

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

- /home/lamarche/programming/optimal_partition/src/uni_set.hpp
- /home/lamarche/programming/optimal_partition/src/uni_set.cpp

5.18 HNode Class Reference

Public Member Functions

- **HNode** (int index=-1)
- void **addChild** (HNode ∗node)
- void **setObjectiveFunction** (ObjectiveFunction ∗m)
- void **print** ()
- void **printIndices** (bool endl=false)
- void **buildDataStructure** (HNode ∗root=0, int level=0, int num=0)
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue ∗maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- Partition ∗ **getOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition ∗partition)

Public Attributes

- int **index**
- std::set< int > ∗ **indices**
- int **level**
- int **size**
- int **width**
- int **num**

- HNode * **root**
- HNodeSet * **children**
- ObjectiveFunction * **objective**
- ObjectiveValue * **value**
- double **optimalValue**
- bool **optimalCut**

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

- /home/lamarche/programming/optimal_partition/src/hierarchical_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_set.cpp

5.19 HONode Class Reference

Public Member Functions

- **HONode** (int size, int index=-1)
- int **getIndex** (int i, int j)
- void **addChild** (HONode *node)
- void **setObjectiveFunction** (ObjectiveFunction *m)
- void **print** ()
- void **buildDataStructure** (int level=0)
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue *maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- Partition * **getOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition *partition, int pi=0, int pj=-1)

Public Attributes

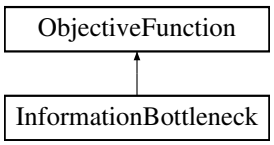
- int **index**
- int **level**
- std::set< int > * **indices**
- HONodeSet * **children**
- ObjectiveFunction * **objective**
- int **size**
- ObjectiveValue ** **qualities**
- double * **optimalValues**
- int * **optimalCuts**

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

- /home/lamarche/programming/optimal_partition/src/hierarchical_ordered_set.hpp
- /home/lamarche/programming/optimal_partition/src/hierarchical_ordered_set.cpp

5.20 InformationBottleneck Class Reference

Inheritance diagram for InformationBottleneck:



Public Member Functions

- **InformationBottleneck** (MarkovProcess *process)
- void setRandom ()

  Randomly set the initial data from which the objective function is computed.
- ObjectiveValue * newObjectiveValue (int index=-1)

  This method is called by child classes of AbstractSet (do not use directly)
- double **getParameter** (double unit)
- double **getUnitDistance** (double uMin, double uMax)
- double **getIntermediaryUnit** (double uMin, double uMax)

Public Attributes

- MarkovProcess * **process**

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

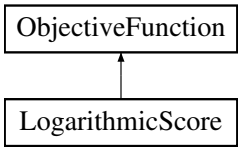
- /home/lamarche/programming/optimal_partition/src/information_bottleneck.hpp
- /home/lamarche/programming/optimal_partition/src/information_bottleneck.cpp

5.21 LogarithmicScore Class Reference

Class to define and compute the logarithmic score function in the case of point prediction.

`#include <logarithmic_score.hpp>`

Inheritance diagram for LogarithmicScore:



Public Member Functions

- LogarithmicScore (PredictionDataset *dataset, int prior=0)

  Constructor.
- ~LogarithmicScore ()

  Destructor.
- void setRandom ()

Randomly set the initial data from which the objective function is computed.

- ObjectiveValue * newObjectiveValue (int index=-1)

  This method is called by child classes of AbstractSet (do not use directly)
- void computeObjectiveValues ()

  This method is called by child classes of AbstractSet (do not use directly)
- void printObjectiveValues (bool verbose=true)

  This method is called by child classes of AbstractSet (do not use directly)
- double **getParameter** (double unit)
- double **getUnitDistance** (double uMin, double uMax)
- double **getIntermediaryUnit** (double uMin, double uMax)

Additional Inherited Members

5.21.1 Detailed Description

Class to define and compute the logarithmic score function in the case of point prediction.

5.21.2 Constructor & Destructor Documentation

5.21.2.1 LogarithmicScore::LogarithmicScore (PredictionDataset * *dataset*, int *prior* = 0)

Constructor.

Parameters

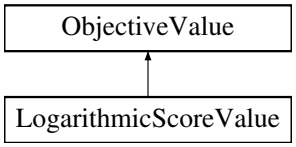
dataset	: The prediction data set that is use to evaluate the score function (from a train set and a test set both containing pre-observations and post-observations)
prior	: A prior giving the number of times each couple of (pre and post) observations has been observed in addition to the train set

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

- /home/lamarche/programming/optimal_partition/src/logarithmic_score.hpp
- /home/lamarche/programming/optimal_partition/src/logarithmic_score.cpp

5.22 LogarithmicScoreValue Class Reference

Inheritance diagram for LogarithmicScoreValue:



Public Member Functions

- **LogarithmicScoreValue** (LogarithmicScore *objective)
- void **add** (ObjectiveValue *value)
- void **compute** ()
- void **compute** (ObjectiveValue *value1, ObjectiveValue *value2)
- void **compute** (ObjectiveValueSet *valueset)

- void **normalize** (ObjectiveValue *q)
- void **print** (bool verbosex=true)
- double **getValue** (double param)

Public Attributes

- int **preSize**
- int **postSize**
- int * **trainCountArray**
- int * **testCountArray**
- int **trainCountTotal**
- int **testCountTotal**
- double **score**

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

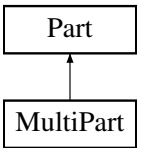
- /home/lamarche/programming/optimal_partition/src/logarithmic_score.hpp
- /home/lamarche/programming/optimal_partition/src/logarithmic_score.cpp

5.23 MultiPart Class Reference

A multi-part is a subset of a multi-dimensional set of elements (individuals)

`#include <partition.hpp>`

Inheritance diagram for MultiPart:



Public Member Functions

- **MultiPart** (Part **partArray, int dimension, ObjectiveValue *value=0)
- **MultiPart** (MultiPart *multiPart)
- bool **equal** (Part *p)
- void **print** (bool endl=false)
- int **printSize** ()

Public Attributes

- int **dimension**
- Part ** **partArray**

5.23.1 Detailed Description

A multi-part is a subset of a multi-dimensional set of elements (individuals)

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

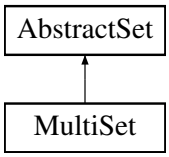
- /home/lamarche/programming/optimal_partition/src/partition.hpp
- /home/lamarche/programming/optimal_partition/src/partition.cpp

5.24 MultiSet Class Reference

A multi-dimensional set of elements based on the Cartesian product of several uni-dimensional sets (UniSet) and their algebraic structures (feasible subsets and feasible refinements)

`#include <multi_set.hpp>`

Inheritance diagram for MultiSet:



Public Member Functions

- MultiSet (UniSet ∗uniSet)

  Number of feasible subsets.
- MultiSet (UniSet ∗∗uniSetArray, int dimension)

  Constructor.
- virtual ∼MultiSet ()
- MultiSubset ∗ getAtomicMultiSubset (int index)
- MultiSubset ∗ getRandomAtomicMultiSubset ()
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction ∗objective)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction ∗objective) should have been called first)
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition ∗ getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **dimension**
- int atomicMultiSubsetNumber

  Number of dimensions.
- int multiSubsetNumber

  Number of elements (e.g., atomic feasible subsets)

Protected Member Functions

- int **getNum** (int *multiNum)
- int * **getMultiNum** (int num)
- void **initReached** ()

Protected Attributes

- UniSet ** **uniSetArray**
- MultiSubset * **firstMultiSubset**
- MultiSubset ** **multiSubsetArray**
- MultiSubset ** **atomicMultiSubsetArray**

5.24.1 Detailed Description

A multi-dimensional set of elements based on the Cartesian product of several uni-dimensional sets (UniSet) and their algebraic structures (feasible subsets and feasible refinements)

5.24.2 Constructor & Destructor Documentation

5.24.2.1 MultiSet::MultiSet (UniSet * *uniSet*)

Number of feasible subsets.

Constructor for a one-dimensional set

Parameters

uniSet	: Pointer to one uni-dimensional set (UniSet)

5.24.2.2 MultiSet::MultiSet (UniSet ** *uniSetArray*, int *dimension*)

Constructor.

Parameters

uniSetArray	: Array of pointers to uni-dimensional sets from which the Cartesian product is computed
dimension	: Number of uni-dimensional sets

5.24.2.3 MultiSet::~MultiSet ( ) [virtual]

Destructor

5.24.3 Member Function Documentation

5.24.3.1 void MultiSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.24.3.2 MultiSubset * MultiSet::getAtomicMultiSubset (int *index*)

Access to an element (e.g., atomic feasible subset) from its index /param The index of the element to access /return A pointer to the unique atomic feasible subset that contains the element

5.24.3.3 Partition * MultiSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.24.3.4 MultiSubset * MultiSet::getRandomAtomicMultiSubset ( )

Access to a random element (e.g., atomic feasible subset) /return A pointer to the unique atomic feasible subset that contains the element

5.24.3.5 void MultiSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.24.3.6 void MultiSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/multi_set.hpp
- /home/lamarche/programming/optimal_partition/src/multi_set.cpp

5.25 MultiSubset Class Reference

Public Member Functions

- **MultiSubset** (UniSubset **uniSubsetArray, int dimension)
- void **print** ()
- void **printIndexSet** (bool endl=false)
- void **addMultiSubsetSet** (MultiSubsetSet *multiSubsetSet)
- void **setObjectiveFunction** (ObjectiveFunction *m)
- void **buildDataStructure** ()
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue *maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition *partition)

Public Attributes

- int **dimension**
- UniSubset ** **uniSubsetArray**
- int **num**
- int **atomicNum**
- bool **isAtomic**
- bool **reached**
- MultiSubsetSetSet * **multiSubsetSetSet**
- MultiSet * **multiSet**
- ObjectiveFunction * **objective**
- ObjectiveValue * **value**
- double **optimalValue**
- MultiSubsetSet * **optimalCut**

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

- /home/lamarche/programming/optimal_partition/src/multi_set.hpp
- /home/lamarche/programming/optimal_partition/src/multi_set.cpp

5.26 NHONode Class Reference

Public Member Functions

- **HONode** (int size, int index=-1)
- int **getIndex** (int i, int j)
- void **addChild** (HONode *node)
- void **setObjectiveFunction** (ObjectiveFunction *m)
- void **print** ()
- void **buildDataStructure** (int level=0)
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue *maxQual=0)
- void **printObjectiveValues** ()
- void **computeOptimalPartition** (double parameter)
- void **printOptimalPartition** (double parameter)
- Partition * **getOptimalPartition** (double parameter)
- void **buildOptimalPartition** (Partition *partition, int pi=0, int pj=-1)

Public Attributes

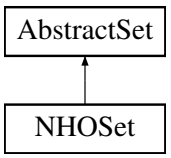
- int **index**
- int **level**
- std::set< int > * **indices**
- HONodeSet * **children**
- ObjectiveFunction * **objective**
- int **size**
- ObjectiveValue ** **qualities**
- double * **optimalValues**
- int * **optimalCuts**

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

- /home/lamarche/programming/optimal_partition/src/NHO_set.hpp

5.27 NHOSet Class Reference

Inheritance diagram for NHOSet:



Public Member Functions

- **NHOSet** (int NSize, HNode *HHierarchy, int OSize)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

- Partition ∗ getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **NSize**
- HNode ∗ **HHierarchy**
- int **OSize**
- NHODatatree ∗ **NHODatatree**

5.27.1 Member Function Documentation

5.27.1.1 void NHOSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.27.1.2 Partition∗ NHOSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.27.1.3 void NHOSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.27.1.4 void NHOSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

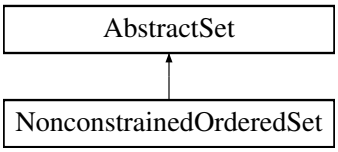
Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/NHO_set.hpp

5.28 NonconstrainedOrderedSet Class Reference

Inheritance diagram for NonconstrainedOrderedSet:



Public Member Functions

- **NonconstrainedOrderedSet** (int size1, int size2)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction ∗m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction ∗objective) should have been called first)
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition ∗ getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **size1**
- int **size2**
- OrderedDatatree * **dataTree**
- ObjectiveValue ** **qualities**

5.28.1 Member Function Documentation

5.28.1.1 void NonconstrainedOrderedSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.28.1.2 Partition * NonconstrainedOrderedSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.28.1.3 void NonconstrainedOrderedSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.28.1.4 void NonconstrainedOrderedSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

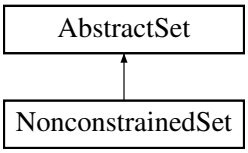
Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/nonconstrained_ordered_set.hpp
- /home/lamarche/programming/optimal_partition/src/nonconstrained_ordered_set.cpp

5.29 NonconstrainedSet Class Reference

Inheritance diagram for NonconstrainedSet:



Public Member Functions

- **NonconstrainedSet** (int size)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction ∗m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void **printDataTree** (bool verbose=true)
- void **printParts** ()
- int **printPartitions** (bool print=true)
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction ∗objective) should have been called first)
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition ∗ getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **size**
- Datatree * **dataTree**
- ObjectiveValue ** **qualities**

5.29.1 Member Function Documentation

5.29.1.1 void NonconstrainedSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.29.1.2 Partition * NonconstrainedSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.29.1.3 void NonconstrainedSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.29.1.4 void NonconstrainedSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

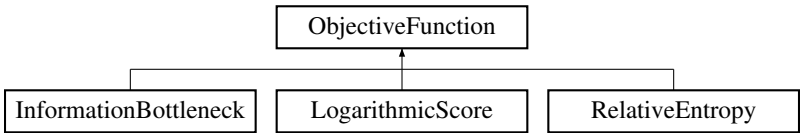
- /home/lamarche/programming/optimal_partition/src/nonconstrained_set.hpp
- /home/lamarche/programming/optimal_partition/src/nonconstrained_set.cpp

5.30 ObjectiveFunction Class Reference

Abstract class defining an objective function to be associated to a constrained set in order to define the optimisation problem that one wants to solve.

`#include <objective_function.hpp>`

Inheritance diagram for ObjectiveFunction:



Public Member Functions

- ObjectiveFunction ()

  True if one deals with a maximisation problem, and false if one deals with a minimisation problem.
- virtual ~ObjectiveFunction ()

  Destructor.
- virtual void setRandom ()=0

  Randomly set the initial data from which the objective function is computed.
- virtual void computeObjectiveValues ()=0

  This method is called by child classes of AbstractSet (do not use directly)
- virtual void printObjectiveValues (bool verbose=true)=0

  This method is called by child classes of AbstractSet (do not use directly)
- virtual ObjectiveValue * newObjectiveValue (int index=-1)=0

  This method is called by child classes of AbstractSet (do not use directly)

Public Attributes

- bool **maximize**

Friends

- class **AbstractSet**

5.30.1 Detailed Description

Abstract class defining an objective function to be associated to a constrained set in order to define the optimisation problem that one wants to solve.

5.30.2 Constructor & Destructor Documentation

5.30.2.1 ObjectiveFunction::ObjectiveFunction ( )

True if one deals with a maximisation problem, and false if one deals with a minimisation problem.

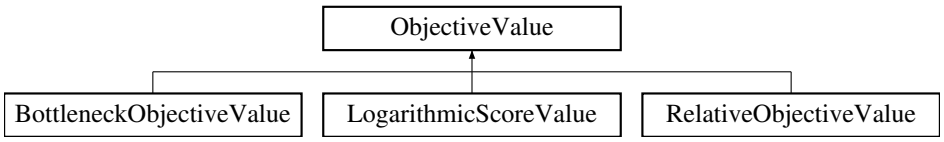
Constructor

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

- /home/lamarche/programming/optimal_partition/src/objective_function.hpp
- /home/lamarche/programming/optimal_partition/src/objective_function.cpp

5.31 ObjectiveValue Class Reference

Inheritance diagram for ObjectiveValue:



Public Member Functions

- virtual void **add** (ObjectiveValue ∗value)=0
- virtual void **compute** ()=0
- virtual void **compute** (ObjectiveValue ∗value1, ObjectiveValue ∗value2)=0
- virtual void **compute** (ObjectiveValueSet ∗valueSet)=0
- virtual void **normalize** (ObjectiveValue ∗normalizingValue)=0
- virtual double **getValue** (double param)=0
- virtual void **print** (bool verbose=true)=0

Public Attributes

- ObjectiveFunction ∗ **objective**

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

- /home/lamarche/programming/optimal_partition/src/objective_function.hpp
- /home/lamarche/programming/optimal_partition/src/objective_function.cpp

5.32 OrderedDatatree Class Reference

Public Member Functions

- **OrderedDatatree** (OrderedDatatree &tree)
- **OrderedDatatree** (int size2, int vertex=-1)
- void **setObjectiveFunction** (ObjectiveFunction ∗objective)
- Vertices ∗ **getAllVertices** ()
- int **getIndex** (int i, int j)
- OrderedDatatree ∗ **addChild** (int v, bool print=true)
- OrderedDatatree ∗ **findChild** (int v)
- OrderedDatatree ∗ **findOrAddChild** (int v, bool print=true)
- void **addBipartition** (OrderedDatatree ∗n1, OrderedDatatree ∗n2)
- void **computeObjectiveValues** ()
- void **normalizeObjectiveValues** (ObjectiveValue ∗maxObjectiveValue=0)
- void **printObjectiveValues** ()
- void **buildOptimalPartition** (Partition ∗partition, int pi=0, int pj=-1)
- void **computeOptimalPartition** (double parameter)

- void **printOptimalPartition** (double parameter)
- Partition * **getOptimalPartition** (double parameter)
- void **print** (bool verbose=false)
- void **printVertices** (bool endl=true)

Public Attributes

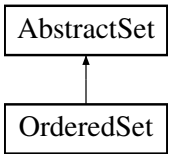
- int **size1**
- int **size2**
- int **vertex**
- bool **wholeSet**
- ObjectiveFunction * **objective**
- OrderedDatatree * **parent**
- OrderedDatatree * **complement**
- OrderedTreesList * **complementList**
- OrderedTreesSet * **children**
- OrderedBipartitionsSet * **bipartitions**
- ObjectiveValue ** **qualities**
- double * **optimalValues**
- int * **optimalCuts**
- OrderedBipartition ** **optimalBipartitions**
- bool **optimized**

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

- /home/lamarche/programming/optimal_partition/src/datatree.hpp
- /home/lamarche/programming/optimal_partition/src/datatree.cpp

5.33 OrderedSet Class Reference

Inheritance diagram for OrderedSet:



Public Member Functions

- **OrderedSet** (int s)
- int **getIndex** (int i, int j)
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)

- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Public Attributes

- int **size**
- ObjectiveValue ** **qualities**
- double * **optimalValues**
- int * **optimalCuts**

5.33.1 Member Function Documentation

5.33.1.1 void OrderedSet::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.33.1.2 Partition * OrderedSet::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.33.1.3 void OrderedSet::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.33.1.4 void OrderedSet::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

Implements AbstractSet.

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

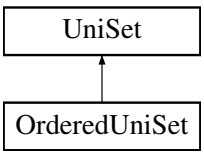
- /home/lamarche/programming/optimal_partition/src/orderedset.hpp
- /home/lamarche/programming/optimal_partition/src/orderedset.cpp

5.34 OrderedUniSet Class Reference

A uni-dimensional set of elements with a total order, and such that the feasible subsets are all the intervals induced by this order.

`#include <uni_set.hpp>`

Inheritance diagram for OrderedUniSet:



Public Member Functions

- OrderedUniSet (int size)

  Number of ordered elements.

Public Attributes

- int **size**

Additional Inherited Members

5.34.1 Detailed Description

A uni-dimensional set of elements with a total order, and such that the feasible subsets are all the intervals induced by this order.

5.34.2 Constructor & Destructor Documentation

5.34.2.1 OrderedUniSet::OrderedUniSet (int *size*)

Number of ordered elements.

Constructor

Parameters

size	: Number of ordered elements

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

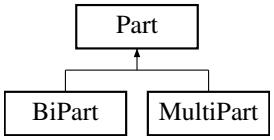
- /home/lamarche/programming/optimal_partition/src/uni_set.hpp
- /home/lamarche/programming/optimal_partition/src/uni_set.cpp

5.35 Part Class Reference

A part is a subset of a set of elements (individuals) represented by integers.

`#include <partition.hpp>`

Inheritance diagram for Part:



Public Member Functions

- **Part** (ObjectiveValue ∗value=0)
- **Part** (Part ∗part)
- **Part** (Datatree ∗node, ObjectiveValue ∗value=0)
- void **addIndividual** (int i, bool front=false)
- Vertices ∗ **getVertices** ()
- virtual bool **equal** (Part ∗p)
- virtual void **print** (bool endl=false)
- virtual int **printSize** ()

Public Attributes

- std::list< int > ∗ **individuals**
- ObjectiveValue ∗ **value**

5.35.1 Detailed Description

A part is a subset of a set of elements (individuals) represented by integers.

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

- /home/lamarche/programming/optimal_partition/src/partition.hpp
- /home/lamarche/programming/optimal_partition/src/partition.cpp

5.36 Partition Class Reference

A partition is a collection of pairwise-disjoint and covering subsets (parts) of a set of elements.

`#include <partition.hpp>`

Public Member Functions

- **Partition** (ObjectiveFunction *objective=0, double parameter=0)
- **Partition** (Partition *partition)
- void **addPart** (Part *p, bool front=false)
- bool **equal** (Partition *p)
- void **print** (bool endl=false)

Public Attributes

- double **parameter**
- std::list< Part * > * **parts**
- ObjectiveValue * **value**

5.36.1 Detailed Description

A partition is a collection of pairwise-disjoint and covering subsets (parts) of a set of elements.

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

- /home/lamarche/programming/optimal_partition/src/partition.hpp
- /home/lamarche/programming/optimal_partition/src/partition.cpp

5.37 PredictionDataset Class Reference

Class to represent a data set for the prediction of a post-measurement from the knowledge of a pre-measurement (composed of a train set and a test set)

`#include <prediction_dataset.hpp>`

Public Member Functions

- PredictionDataset (MultiSet *preMeasurement, MultiSet *postMeasurement)

  Constructor.
- ~PredictionDataset ()

  Destructor.
- void addTrainValue (MultiSubset *preValue, MultiSubset *postValue, int count=1)

  Add a couple of (pre and post) observations to the train set.
- void addTestValue (MultiSubset *preValue, MultiSubset *postValue, int count=1)

  Add a couple of (pre and post) observations to the test set.
- void addTrainValue (int preIndex, int postIndex, int count=1)

  Add a couple of (pre and post) observations to the train set ***in the case of one-dimensional measurements***
- void addTestValue (int preIndex, int postIndex, int count=1)

  Add a couple of (pre and post) observations to the test set ***in the case of one-dimensional measurements***

Public Attributes

- MultiSet * **preMultiSet**
- MultiSet * postMultiSet

  The pre-measurement modelled as a structured multi-dimensional set of elements (the possible observation values)
- std::vector< MultiSubset * > * trainPreValues

  The post-measurement modelled as a structured multi-dimensional set of elements (the possible observation values)
- std::vector< MultiSubset * > * trainPostValues

  A vector of pre-observations that are used to train the predictor.
- std::vector< int > * trainCountValues

  A vector of post-observations that are used to train the predictor.
- std::vector< MultiSubset * > * **testPreValues**
- std::vector< MultiSubset * > * testPostValues

  A vector of pre-observations that are used to test the predictor.
- std::vector< int > * testCountValues

  A vector of post-observations that are used to test the predictor.

5.37.1 Detailed Description

Class to represent a data set for the prediction of a post-measurement from the knowledge of a pre-measurement (composed of a train set and a test set)

5.37.2 Constructor & Destructor Documentation

5.37.2.1 PredictionDataset::PredictionDataset (MultiSet * *preMeasurement*, MultiSet * *postMeasurement*)

Constructor.

Parameters

preMeasurement	: The pre-measurement modelled as a structured multi-dimensional set of elements (the possible observation values)
post-Measurement	: The post-measurement modelled as a structured multi-dimensional set of elements (the possible observation values)

5.37.3 Member Function Documentation

5.37.3.1 void PredictionDataset::addTestValue (MultiSubset * *preValue*, MultiSubset * *postValue*, int *count* = 1)

Add a couple of (pre and post) observations to the test set.

Parameters

preValue	: A pointer to the feasible subset that has been pre-observed in the multi-dimensional set representing the pre-measurement. It should always be an element of the set, that is an atomic feasible subset
preValue	: A pointer to the feasible subset that has been post-observed in the multi-dimensional set representing the pre-measurement. It should always be an element of the set, that is an atomic feasible subset

count	: The number of times the couple has been observed

5.37.3.2 void PredictionDataset::addTestValue (int *preIndex*, int *postIndex*, int *count* = 1)

Add a couple of (pre and post) observations to the test set **in the case of one-dimensional measurements**

Parameters

preIndex	: The index of the element that has been pre-observed in the one-dimensional set representing the pre-measurement
postIndex	: The index of the element that has been post-observed in the one-dimensional set representing the pre-measurement
count	: The number of times the couple has been observed

5.37.3.3 void PredictionDataset::addTrainValue (MultiSubset * *preValue*, MultiSubset * *postValue*, int *count* = 1)

Add a couple of (pre and post) observations to the train set.

Parameters

preValue	: A pointer to the feasible subset that have been pre-observed in the multi-dimensional set representing the pre-measurement. It should always be an element of the set, that is an atomic feasible subset
preValue	: A pointer to the feasible subset that have been post-observed in the multi-dimensional set representing the pre-measurement. It should always be an element of the set, that is an atomic feasible subset
count	: The number of times the couple has been observed

5.37.3.4 void PredictionDataset::addTrainValue (int *preIndex*, int *postIndex*, int *count* = 1)

Add a couple of (pre and post) observations to the train set **in the case of one-dimensional measurements**

Parameters

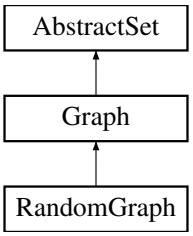
preIndex	: The index of the element that has been pre-observed in the one-dimensional set representing the pre-measurement
postIndex	: The index of the element that has been post-observed in the one-dimensional set representing the pre-measurement
count	: The number of times the couple has been observed

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

- /home/lamarche/programming/optimal_partition/src/prediction_dataset.hpp
- /home/lamarche/programming/optimal_partition/src/prediction_dataset.cpp

5.38 RandomGraph Class Reference

Inheritance diagram for RandomGraph:



Public Member Functions

- **RandomGraph** (int vNum, int eNum)

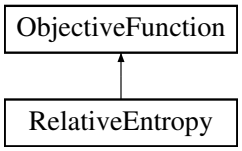
Additional Inherited Members

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.39 RelativeEntropy Class Reference

Inheritance diagram for RelativeEntropy:



Public Member Functions

- **RelativeEntropy** (int size, double ∗values=0, double ∗refValues=0)
- void setRandom ()

  Randomly set the initial data from which the objective function is computed.
- ObjectiveValue ∗ newObjectiveValue (int index=-1)

  This method is called by child classes of AbstractSet (do not use directly)
- void computeObjectiveValues ()

  This method is called by child classes of AbstractSet (do not use directly)
- void printObjectiveValues (bool verbose=true)

  This method is called by child classes of AbstractSet (do not use directly)
- double **getParameter** (double unit)
- double **getUnitDistance** (double uMin, double uMax)
- double **getIntermediaryUnit** (double uMin, double uMax)

Public Attributes

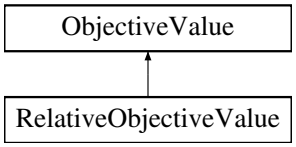
- int **size**
- double ∗ **values**
- double ∗ **refValues**

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

- /home/lamarche/programming/optimal_partition/src/relative_entropy.hpp
- /home/lamarche/programming/optimal_partition/src/relative_entropy.cpp

5.40 RelativeObjectiveValue Class Reference

Inheritance diagram for RelativeObjectiveValue:



Public Member Functions

- **RelativeObjectiveValue** (RelativeEntropy ∗objective, int index=-1)
- void **add** (ObjectiveValue ∗value)
- void **compute** ()
- void **compute** (ObjectiveValue ∗value1, ObjectiveValue ∗value2)
- void **compute** (ObjectiveValueSet ∗valueset)
- void **normalize** (ObjectiveValue ∗q)
- void **print** (bool verbose=true)
- double **getValue** (double param)

Public Attributes

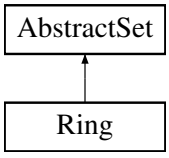
- int **index**
- double **sumValue**
- double **sumRefValue**
- double **microInfo**
- double **divergence**
- double **sizeReduction**

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

- /home/lamarche/programming/optimal_partition/src/relative_entropy.hpp
- /home/lamarche/programming/optimal_partition/src/relative_entropy.cpp

5.41 Ring Class Reference

Inheritance diagram for Ring:



Public Member Functions

- **Ring** (int s)
- int **getIndex** (int i, int j)
- void setObjectiveFunction (ObjectiveFunction *m)

  Set the objective that one wants to optimise.
- void setRandom ()

  Randomly set the algebraic constraints for quick experiments (warning: this method is not always implemented)
- void print ()

  Print the set and its algebraic constraints.
- void buildDataStructure ()

  Build a proper data structure to represent the set and its algebraic constraints (warning: this method should always be called after instantiating and parameterising a set, and before calling any other method, such as print(), computeObjectiveValues(), computeOptimalPartition (double parameter), etc.)
- void computeObjectiveValues ()

  *Compute the value of the objective function for each feasible part (warning: setObjectiveFunction (ObjectiveFunction *objective) should have been called first)*
- void normalizeObjectiveValues ()

  Finish computing the value of the objective function for each feasible part when normalisation is required (warning: only after computeObjectiveValues() has been called)
- void printObjectiveValues ()

  Print the value of the objective function for each feasible part.
- void computeOptimalPartition (double parameter)

  Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.
- void printOptimalPartition (double parameter)

  Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- Partition * getOptimalPartition (double parameter)

  Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)
- AbstractSet * **getRandomSet** (int size)

Public Attributes

- int **size**
- double * **values**
- double * **sumValues**
- double * **microInfos**
- double * **sizeReductions**
- double * **divergences**
- double * **optimalQualities**
- int * **optimalCuts**
- int **firstOptimalCut**
- int **lastOptimalCut**

5.41.1 Member Function Documentation

5.41.1.1 void Ring::computeOptimalPartition (double *parameter*) [virtual]

Compute a partition that fits with the algebraic constraints and that optimises the objective function that has been specified.

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.41.1.2 Partition * Ring::getOptimalPartition (double *parameter*) [virtual]

Compute and return a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Returns

: The resulting optimal partition

Implements AbstractSet.

5.41.1.3 void Ring::printOptimalPartition (double *parameter*) [virtual]

Compute and print a partition that fits with the algebraic constraints and that optimises the objective function that has been specified (warning: this method is not always implemented, but one can obtain a similar result by using getOptimalPartition (double parameter) and by calling print() on the result)

Parameters

parameter	: The parameter of the objective function to be optimised (if the objective is parametrised)

Implements AbstractSet.

5.41.1.4 void Ring::setObjectiveFunction (ObjectiveFunction * *objective*) [virtual]

Set the objective that one wants to optimise.

Parameters

objective	: The objective function itself

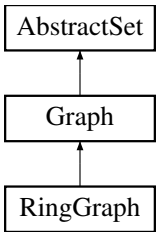
Implements AbstractSet.

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

- /home/lamarche/programming/optimal_partition/src/ring.hpp
- /home/lamarche/programming/optimal_partition/src/ring.cpp

5.42 RingGraph Class Reference

Inheritance diagram for RingGraph:



Public Member Functions

- **RingGraph** (int vNum)

Additional Inherited Members

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

- /home/lamarche/programming/optimal_partition/src/graph.hpp
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.43 Timer Class Reference

Public Member Functions

- **Timer** (char ∗file=0, int dimension=1, bool append=false)
- void **start** (int size, std::string text="")
- void **start** (std::vector< int > parameters, std::string text="")
- void **startTime** ()
- void **startMemory** ()
- void **stop** (std::string text="")
- void **stopTime** ()
- void **stopMemory** ()
- void **step** (std::string text="")
- void **print** (char ∗fName)

Public Attributes

- float **time**
- int **memory**

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

- /home/lamarche/programming/optimal_partition/src/timer.hpp
- /home/lamarche/programming/optimal_partition/src/timer.cpp

5.44 TreeToAdd Struct Reference

Public Attributes

- Datatree ∗ **node**
- Datatree ∗ **nodeToAdd**

- Vertices * **vertices**
- Vertices * **adjVertices**

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

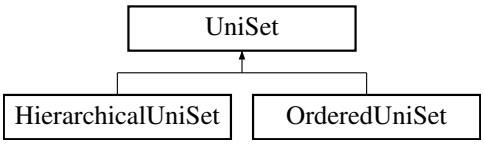
- /home/lamarche/programming/optimal_partition/src/graph.cpp

5.45 UniSet Class Reference

A uni-dimensional set of elements and its algebraic structure (feasible subsets and feasible refinements)

`#include <uni_set.hpp>`

Inheritance diagram for UniSet:



Public Member Functions

- UniSet (UniSubset *firstUniSubset)

  Constructor.
- ~UniSet ()

  Destructor.
- void buildDataStructure ()

  Build a proper data structure to represent the uni-dimensional set of elements and its algebraic structure (warning: this method should be called after construction, and before actually using the set)
- void print ()

  Print the current state of the set and its algebraic structure.

Protected Member Functions

- void initReached ()

  Top subset in the lattice of feasible subsets (assumed to be unique and to include all feasible subsets)

Protected Attributes

- int **atomicUniSubsetNumber**
- int uniSubsetNumber

  Number of elements (i.e., atomic feasible subsets)
- UniSubset ** atomicUniSubsetArray

  Number of feasible subsets.
- UniSubset ** uniSubsetArray

  Array of pointers to all elements (i.e., atomic feasible subsets)
- UniSubset * firstUniSubset

  Array of pointers to all feasible subsets.

5.45.1 Detailed Description

A uni-dimensional set of elements and its algebraic structure (feasible subsets and feasible refinements)

5.45.2 Constructor & Destructor Documentation

5.45.2.1 UniSet::UniSet (UniSubset * *firstUniSubset*)

Constructor.

Parameters

firstUniSubset	: Top subset in the lattice of feasible subsets

5.45.3 Member Function Documentation

5.45.3.1 void UniSet::initReached ( ) [protected]

Top subset in the lattice of feasible subsets (assumed to be unique and to include all feasible subsets)

Initialise the `reached` field of all feasible subsets to `false` (used by other methods to run through the algebraic structure in a recursive fashion without considering twice the same subset)

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

- /home/lamarche/programming/optimal_partition/src/uni_set.hpp
- /home/lamarche/programming/optimal_partition/src/uni_set.cpp

5.46 UniSubset Class Reference

A feasible subset associated to a uni-dimensional set of elements (UniSet)

`#include <uni_set.hpp>`

Public Member Functions

- UniSubset (int index=-1)

  Set of the refinements of this subset, that is the set of all partitions of this subset that are made of other feasible subsets; this hence properly defines the algebraic structure.
- ~UniSubset ()

  Destructor.
- void print ()

  Print the actual state of this subset.
- void printIndexSet (bool endl=false)

  Print indexes of the elements in this subset.
- void addUniSubsetSet (UniSubsetSet *uniSubsetSet)

  Add a refinement to this subset, that is a partition of this subset that is made of other feasible subsets.

Public Attributes

- UniSet * **uniSet**
- bool isAtomic

  Pointer to the set of elements to which this subset is associated.

- int atomicNum

  `true` *if and only if this subset is actually an element of the associated set (i.e., an atomic feasible subset)*
- int num

  If this subset is an element (i.e., an atomic feasible subset), identifier of this subset among all the elements of the associated set; if not, always equal to `-1`
- IndexSet * indexSet

  Identifier of this subset among all the feasible subsets of the associated set.
- UniSubsetSetSet * uniSubsetSetSet

  Indexes of all the elements in this subset (only one index / one element in the case of an atomic subset)

5.46.1 Detailed Description

A feasible subset associated to a uni-dimensional set of elements (UniSet)

5.46.2 Constructor & Destructor Documentation

5.46.2.1 UniSubset::UniSubset (int *index* = `-1`)

Set of the refinements of this subset, that is the set of all partitions of this subset that are made of other feasible subsets; this hence properly defines the algebraic structure.

Constructor

Parameters

index	: The index of the unique element in the case of an atomic subset

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

- /home/lamarche/programming/optimal_partition/src/uni_set.hpp
- /home/lamarche/programming/optimal_partition/src/uni_set.cpp

Chapter 6

File Documentation

6.1 /home/lamarche/programming/optimal_partition/src/abstract_set.hpp File Reference

Abstract class defining a set of elements that one wants to partition while optimising some (decomposable) objective and preserving some algebraic constraints (set of feasible parts)

```
#include "timer.hpp"
#include "objective_function.hpp"
#include "partition.hpp"
#include "dataset.hpp"
```

Classes

- class AbstractSet

  Abstract class defining a set of elements that one wants to partition while optimising some (decomposable) objective and preserving some algebraic constraints (set of feasible parts)

6.1.1 Detailed Description

Abstract class defining a set of elements that one wants to partition while optimising some (decomposable) objective and preserving some algebraic constraints (set of feasible parts)

Author

Robin Lamarche-Perrin

Date

06/11/2015

6.2 /home/lamarche/programming/optimal_partition/src/logarithmic_score.hpp File Reference

Classes to define and compute the logarithmic score function in the case of point prediction.

```
#include "objective_function.hpp"
#include "prediction_dataset.hpp"
```

Classes

- class LogarithmicScore

  Class to define and compute the logarithmic score function in the case of point prediction.
- class LogarithmicScoreValue

6.2.1 Detailed Description

Classes to define and compute the logarithmic score function in the case of point prediction.

Author

Robin Lamarche-Perrin

Date

06/11/2015

6.3 /home/lamarche/programming/optimal_partition/src/multi_set.hpp File Reference

Classes to represent multi-dimensional sets of elements and their algebraic structure (feasible subsets and feasible refinements)

```
#include <list>
#include "uni_set.hpp"
#include "abstract_set.hpp"
```

Classes

- class MultiSet

  A multi-dimensional set of elements based on the Cartesian product of several uni-dimensional sets (UniSet) and their algebraic structures (feasible subsets and feasible refinements)
- class MultiSubset

Typedefs

- typedef std::list< MultiSubset * > **MultiSubsetSet**
- typedef std::list
  < MultiSubsetSet * > **MultiSubsetSetSet**

6.3.1 Detailed Description

Classes to represent multi-dimensional sets of elements and their algebraic structure (feasible subsets and feasible refinements)

Author

Robin Lamarche-Perrin

Date

06/11/2015

6.4 /home/lamarche/programming/optimal_partition/src/objective_function.hpp File Reference

Abstract class defining an objective function to be associated to a constrained set in order to define the optimisation problem that one wants to solve.

```
#include <set>
```

Classes

- class ObjectiveFunction

  Abstract class defining an objective function to be associated to a constrained set in order to define the optimisation problem that one wants to solve.
- class ObjectiveValue

Typedefs

- typedef std::set
  < ObjectiveValue * > **ObjectiveValueSet**

6.4.1 Detailed Description

Abstract class defining an objective function to be associated to a constrained set in order to define the optimisation problem that one wants to solve.

Author

Robin Lamarche-Perrin

Date

06/11/2015

6.5 /home/lamarche/programming/optimal_partition/src/prediction_dataset.hpp File Reference

Class to represent a data set for the prediction of a post-measurement from the knowledge of a pre-measurement (composed of a train set and a test set)

```
#include "multi_set.hpp"
```

Classes

- class PredictionDataset

  Class to represent a data set for the prediction of a post-measurement from the knowledge of a pre-measurement (composed of a train set and a test set)

6.5.1 Detailed Description

Class to represent a data set for the prediction of a post-measurement from the knowledge of a pre-measurement (composed of a train set and a test set)

Author

Robin Lamarche-Perrin

Date

06/11/2015

6.6 /home/lamarche/programming/optimal_partition/src/uni_set.hpp File Reference

Some classes to represent uni-dimensional sets of elements and their algebraic structure (feasible subsets and feasible refinements)

```
#include <list>
#include "bi_set.hpp"
#include "multi_set.hpp"
```

Classes

- class UniSet

  A uni-dimensional set of elements and its algebraic structure (feasible subsets and feasible refinements)
- class OrderedUniSet

  A uni-dimensional set of elements with a total order, and such that the feasible subsets are all the intervals induced by this order.
- class HierarchicalUniSet

  A uni-dimensional set of elements structured according to a complete binary hierarchy, and such that the feasible subsets are all the nodes of the hierarchy.
- class UniSubset

  A feasible subset associated to a uni-dimensional set of elements (UniSet)

Typedefs

- typedef std::list< UniSubset * > **UniSubsetSet**
- typedef std::list< UniSubsetSet * > **UniSubsetSetSet**
- typedef std::list< int > **IndexSet**

6.6.1 Detailed Description

Some classes to represent uni-dimensional sets of elements and their algebraic structure (feasible subsets and feasible refinements)

Author

Robin Lamarche-Perrin

Date

06/11/2015

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