

---

# Multi-Label Dataset Analyzer

## API Documentation

---



# Contents

<b>1</b>	<b>Introduction</b>	<b>121</b>
1.1	Structure . . . . .	121
1.2	Examples . . . . .	122
<b>2</b>	<b>Class Hierarchy</b>	<b>124</b>
2.1	Classes . . . . .	124
<b>3</b>	<b>Package mldc.attributes</b>	<b>126</b>
3.1	Class AvgAbsoluteCorrelationBetweenNumericAttributes . . . . .	127
3.1.1	Declaration . . . . .	127
3.1.2	Constructor summary . . . . .	127
3.1.3	Method summary . . . . .	127
3.1.4	Constructors . . . . .	127
3.1.5	Methods . . . . .	127
3.1.6	Members inherited from class MLDataMetric . . . . .	127
3.2	Class AvgGainRatio . . . . .	128
3.2.1	Declaration . . . . .	128
3.2.2	Constructor summary . . . . .	128
3.2.3	Method summary . . . . .	128
3.2.4	Constructors . . . . .	128
3.2.5	Methods . . . . .	128
3.2.6	Members inherited from class MLDataMetric . . . . .	128
3.3	Class BinaryAttributes . . . . .	129
3.3.1	Declaration . . . . .	129
3.3.2	Constructor summary . . . . .	129
3.3.3	Method summary . . . . .	129
3.3.4	Constructors . . . . .	129
3.3.5	Methods . . . . .	129
3.3.6	Members inherited from class MLDataMetric . . . . .	129
3.4	Class MeanEntropiesNominalAttributes . . . . .	130
3.4.1	Declaration . . . . .	130
3.4.2	Constructor summary . . . . .	130
3.4.3	Method summary . . . . .	130
3.4.4	Constructors . . . . .	130
3.4.5	Methods . . . . .	130
3.4.6	Members inherited from class MLDataMetric . . . . .	130

3.5	Class MeanKurtosis . . . . .	131
3.5.1	Declaration . . . . .	131
3.5.2	Constructor summary . . . . .	131
3.5.3	Method summary . . . . .	131
3.5.4	Constructors . . . . .	131
3.5.5	Methods . . . . .	131
3.5.6	Members inherited from class MLDataMetric . . . . .	131
3.6	Class MeanOfMeanOfNumericAttributes . . . . .	132
3.6.1	Declaration . . . . .	132
3.6.2	Constructor summary . . . . .	132
3.6.3	Method summary . . . . .	132
3.6.4	Constructors . . . . .	132
3.6.5	Methods . . . . .	132
3.6.6	Members inherited from class MLDataMetric . . . . .	132
3.7	Class MeanSkewnessNumericAttributes . . . . .	133
3.7.1	Declaration . . . . .	133
3.7.2	Constructor summary . . . . .	133
3.7.3	Method summary . . . . .	133
3.7.4	Constructors . . . . .	133
3.7.5	Methods . . . . .	133
3.7.6	Members inherited from class MLDataMetric . . . . .	133
3.8	Class MeanStdvNumericAttributes . . . . .	134
3.8.1	Declaration . . . . .	134
3.8.2	Constructor summary . . . . .	134
3.8.3	Method summary . . . . .	134
3.8.4	Constructors . . . . .	134
3.8.5	Methods . . . . .	134
3.8.6	Members inherited from class MLDataMetric . . . . .	134
3.9	Class NominalAttributes . . . . .	135
3.9.1	Declaration . . . . .	135
3.9.2	Constructor summary . . . . .	135
3.9.3	Method summary . . . . .	135
3.9.4	Constructors . . . . .	135
3.9.5	Methods . . . . .	135
3.9.6	Members inherited from class MLDataMetric . . . . .	135
3.10	Class NumericAttributes . . . . .	136
3.10.1	Declaration . . . . .	136
3.10.2	Constructor summary . . . . .	136
3.10.3	Method summary . . . . .	136
3.10.4	Constructors . . . . .	136
3.10.5	Methods . . . . .	136
3.10.6	Members inherited from class MLDataMetric . . . . .	136
3.11	Class ProportionBinaryAttributes . . . . .	137
3.11.1	Declaration . . . . .	137
3.11.2	Constructor summary . . . . .	137
3.11.3	Method summary . . . . .	137

3.11.4	Constructors	137
3.11.5	Methods	137
3.11.6	Members inherited from class MLDataMetric	137
3.12	Class ProportionNominalAttributes	138
3.12.1	Declaration	138
3.12.2	Constructor summary	138
3.12.3	Method summary	138
3.12.4	Constructors	138
3.12.5	Methods	138
3.12.6	Members inherited from class MLDataMetric	138
3.13	Class ProportionNumericAttributes	139
3.13.1	Declaration	139
3.13.2	Constructor summary	139
3.13.3	Method summary	139
3.13.4	Constructors	139
3.13.5	Methods	139
3.13.6	Members inherited from class MLDataMetric	139
3.14	Class ProportionNumericAttributesWithOutliers	140
3.14.1	Declaration	140
3.14.2	Constructor summary	140
3.14.3	Method summary	140
3.14.4	Constructors	140
3.14.5	Methods	140
3.14.6	Members inherited from class MLDataMetric	140
<b>4</b>	<b>Package mldc.base</b>	<b>141</b>
4.1	Class MLDataCharacterization	141
4.1.1	Declaration	141
4.1.2	Field summary	141
4.1.3	Constructor summary	141
4.1.4	Method summary	142
4.1.5	Fields	142
4.1.6	Constructors	142
4.1.7	Methods	143
4.2	Class MLDataMetric	145
4.2.1	Declaration	145
4.2.2	All known subclasses	146
4.2.3	Field summary	146
4.2.4	Constructor summary	146
4.2.5	Method summary	146
4.2.6	Fields	147
4.2.7	Constructors	147
4.2.8	Methods	147

<b>5</b>	<b>Package mldc.dimensionality</b>	<b>149</b>
5.1	Class Attributes	149
5.1.1	Declaration	149
5.1.2	Constructor summary	149
5.1.3	Method summary	149
5.1.4	Constructors	150
5.1.5	Methods	150
5.1.6	Members inherited from class MLDataMetric	150
5.2	Class DistinctLabelsets	150
5.2.1	Declaration	150
5.2.2	Constructor summary	150
5.2.3	Method summary	150
5.2.4	Constructors	151
5.2.5	Methods	151
5.2.6	Members inherited from class MLDataMetric	151
5.3	Class Instances	151
5.3.1	Declaration	151
5.3.2	Constructor summary	151
5.3.3	Method summary	151
5.3.4	Constructors	152
5.3.5	Methods	152
5.3.6	Members inherited from class MLDataMetric	152
5.4	Class Labels	152
5.4.1	Declaration	152
5.4.2	Constructor summary	152
5.4.3	Method summary	152
5.4.4	Constructors	153
5.4.5	Methods	153
5.4.6	Members inherited from class MLDataMetric	153
5.5	Class LxIxF	153
5.5.1	Declaration	153
5.5.2	Constructor summary	153
5.5.3	Method summary	153
5.5.4	Constructors	154
5.5.5	Methods	154
5.5.6	Members inherited from class MLDataMetric	154
5.6	Class RatioInstancesToAttributes	154
5.6.1	Declaration	154
5.6.2	Constructor summary	154
5.6.3	Method summary	154
5.6.4	Constructors	155
5.6.5	Methods	155
5.6.6	Members inherited from class MLDataMetric	155

<b>6</b>	<b>Package mldc.imbalance</b>	<b>156</b>
6.1	Class CVIRInterClass	157
6.1.1	Declaration	157
6.1.2	Constructor summary	157
6.1.3	Method summary	157
6.1.4	Constructors	157
6.1.5	Methods	157
6.1.6	Members inherited from class ImbalanceDataMetric	157
6.1.7	Members inherited from class MLDataMetric	158
6.2	Class ImbalanceDataMetric	158
6.2.1	Declaration	158
6.2.2	All known subclasses	158
6.2.3	Field summary	158
6.2.4	Constructor summary	158
6.2.5	Method summary	158
6.2.6	Fields	158
6.2.7	Constructors	158
6.2.8	Methods	159
6.2.9	Members inherited from class MLDataMetric	159
6.3	Class KurtosisCardinality	159
6.3.1	Declaration	159
6.3.2	Constructor summary	159
6.3.3	Method summary	159
6.3.4	Constructors	160
6.3.5	Methods	160
6.3.6	Members inherited from class ImbalanceDataMetric	160
6.3.7	Members inherited from class MLDataMetric	160
6.4	Class MaxIRInterClass	160
6.4.1	Declaration	160
6.4.2	Constructor summary	161
6.4.3	Method summary	161
6.4.4	Constructors	161
6.4.5	Methods	161
6.4.6	Members inherited from class ImbalanceDataMetric	161
6.4.7	Members inherited from class MLDataMetric	161
6.5	Class MaxIRIntraClass	161
6.5.1	Declaration	162
6.5.2	Constructor summary	162
6.5.3	Method summary	162
6.5.4	Constructors	162
6.5.5	Methods	162
6.5.6	Members inherited from class ImbalanceDataMetric	162
6.5.7	Members inherited from class MLDataMetric	162
6.6	Class MaxIRLabelset	163
6.6.1	Declaration	163
6.6.2	Constructor summary	163

6.6.3	Method summary . . . . .	163
6.6.4	Constructors . . . . .	163
6.6.5	Methods . . . . .	163
6.6.6	Members inherited from class ImbalanceDataMetric . . . . .	163
6.6.7	Members inherited from class MLDataMetric . . . . .	164
6.7	Class MeanIRInterClass . . . . .	164
6.7.1	Declaration . . . . .	164
6.7.2	Constructor summary . . . . .	164
6.7.3	Method summary . . . . .	164
6.7.4	Constructors . . . . .	164
6.7.5	Methods . . . . .	164
6.7.6	Members inherited from class ImbalanceDataMetric . . . . .	165
6.7.7	Members inherited from class MLDataMetric . . . . .	165
6.8	Class MeanIRIntraClass . . . . .	165
6.8.1	Declaration . . . . .	165
6.8.2	Constructor summary . . . . .	165
6.8.3	Method summary . . . . .	165
6.8.4	Constructors . . . . .	165
6.8.5	Methods . . . . .	165
6.8.6	Members inherited from class ImbalanceDataMetric . . . . .	166
6.8.7	Members inherited from class MLDataMetric . . . . .	166
6.9	Class MeanIRLabelset . . . . .	166
6.9.1	Declaration . . . . .	166
6.9.2	Constructor summary . . . . .	166
6.9.3	Method summary . . . . .	166
6.9.4	Constructors . . . . .	166
6.9.5	Methods . . . . .	167
6.9.6	Members inherited from class ImbalanceDataMetric . . . . .	167
6.9.7	Members inherited from class MLDataMetric . . . . .	167
6.10	Class MeanStdvIRIntraClass . . . . .	167
6.10.1	Declaration . . . . .	167
6.10.2	Constructor summary . . . . .	167
6.10.3	Method summary . . . . .	167
6.10.4	Constructors . . . . .	168
6.10.5	Methods . . . . .	168
6.10.6	Members inherited from class ImbalanceDataMetric . . . . .	168
6.10.7	Members inherited from class MLDataMetric . . . . .	168
6.11	Class PMax . . . . .	168
6.11.1	Declaration . . . . .	168
6.11.2	Constructor summary . . . . .	169
6.11.3	Method summary . . . . .	169
6.11.4	Constructors . . . . .	169
6.11.5	Methods . . . . .	169
6.11.6	Members inherited from class ImbalanceDataMetric . . . . .	169
6.11.7	Members inherited from class MLDataMetric . . . . .	169
6.12	Class PUniq . . . . .	169



6.12.1	Declaration . . . . .	170
6.12.2	Constructor summary . . . . .	170
6.12.3	Method summary . . . . .	170
6.12.4	Constructors . . . . .	170
6.12.5	Methods . . . . .	170
6.12.6	Members inherited from class ImbalanceDataMetric . . . . .	170
6.12.7	Members inherited from class MLDataMetric . . . . .	170
6.13	Class SkewnessCardinality . . . . .	171
6.13.1	Declaration . . . . .	171
6.13.2	Constructor summary . . . . .	171
6.13.3	Method summary . . . . .	171
6.13.4	Constructors . . . . .	171
6.13.5	Methods . . . . .	171
6.13.6	Members inherited from class ImbalanceDataMetric . . . . .	171
6.13.7	Members inherited from class MLDataMetric . . . . .	172
<b>7</b>	<b>Package mldc.labelsDistribution</b>	<b>173</b>
7.1	Class Cardinality . . . . .	173
7.1.1	Declaration . . . . .	173
7.1.2	Constructor summary . . . . .	173
7.1.3	Method summary . . . . .	173
7.1.4	Constructors . . . . .	174
7.1.5	Methods . . . . .	174
7.1.6	Members inherited from class MLDataMetric . . . . .	174
7.2	Class Density . . . . .	174
7.2.1	Declaration . . . . .	174
7.2.2	Constructor summary . . . . .	174
7.2.3	Method summary . . . . .	174
7.2.4	Constructors . . . . .	175
7.2.5	Methods . . . . .	175
7.2.6	Members inherited from class MLDataMetric . . . . .	175
7.3	Class MaxEntropy . . . . .	175
7.3.1	Declaration . . . . .	175
7.3.2	Constructor summary . . . . .	175
7.3.3	Method summary . . . . .	175
7.3.4	Constructors . . . . .	176
7.3.5	Methods . . . . .	176
7.3.6	Members inherited from class MLDataMetric . . . . .	176
7.4	Class MeanEntropy . . . . .	176
7.4.1	Declaration . . . . .	176
7.4.2	Constructor summary . . . . .	176
7.4.3	Method summary . . . . .	176
7.4.4	Constructors . . . . .	177
7.4.5	Methods . . . . .	177
7.4.6	Members inherited from class MLDataMetric . . . . .	177
7.5	Class MinEntropy . . . . .	177

7.5.1	Declaration . . . . .	177
7.5.2	Constructor summary . . . . .	177
7.5.3	Method summary . . . . .	177
7.5.4	Constructors . . . . .	178
7.5.5	Methods . . . . .	178
7.5.6	Members inherited from class MLDataMetric . . . . .	178
7.6	Class StdvCardinality . . . . .	178
7.6.1	Declaration . . . . .	178
7.6.2	Constructor summary . . . . .	178
7.6.3	Method summary . . . . .	178
7.6.4	Constructors . . . . .	179
7.6.5	Methods . . . . .	179
7.6.6	Members inherited from class MLDataMetric . . . . .	179
<b>8</b>	<b>Package mldc.labelsRelation</b>	<b>180</b>
8.1	Class AvgExamplesPerLabelset . . . . .	181
8.1.1	Declaration . . . . .	181
8.1.2	Constructor summary . . . . .	181
8.1.3	Method summary . . . . .	181
8.1.4	Constructors . . . . .	181
8.1.5	Methods . . . . .	182
8.1.6	Members inherited from class MLDataMetric . . . . .	182
8.2	Class AvgUnconditionalDependentLabelPairsByChiSquare . . . . .	182
8.2.1	Declaration . . . . .	182
8.2.2	Constructor summary . . . . .	182
8.2.3	Method summary . . . . .	182
8.2.4	Constructors . . . . .	182
8.2.5	Methods . . . . .	183
8.2.6	Members inherited from class MLDataMetric . . . . .	183
8.3	Class Bound . . . . .	183
8.3.1	Declaration . . . . .	183
8.3.2	Constructor summary . . . . .	183
8.3.3	Method summary . . . . .	183
8.3.4	Constructors . . . . .	183
8.3.5	Methods . . . . .	184
8.3.6	Members inherited from class MLDataMetric . . . . .	184
8.4	Class Diversity . . . . .	184
8.4.1	Declaration . . . . .	184
8.4.2	Constructor summary . . . . .	184
8.4.3	Method summary . . . . .	184
8.4.4	Constructors . . . . .	184
8.4.5	Methods . . . . .	185
8.4.6	Members inherited from class MLDataMetric . . . . .	185
8.5	Class LabelsetsUpTo10Examples . . . . .	185
8.5.1	Declaration . . . . .	185
8.5.2	Constructor summary . . . . .	185

8.5.3	Constructors	185
8.5.4	Members inherited from class LabelsetsUpToNExamples	185
8.5.5	Members inherited from class MLDataMetric	186
8.6	Class LabelsetsUpTo2Examples	186
8.6.1	Declaration	186
8.6.2	Constructor summary	186
8.6.3	Constructors	186
8.6.4	Members inherited from class LabelsetsUpToNExamples	186
8.6.5	Members inherited from class MLDataMetric	186
8.7	Class LabelsetsUpTo50Examples	186
8.7.1	Declaration	187
8.7.2	Constructor summary	187
8.7.3	Constructors	187
8.7.4	Members inherited from class LabelsetsUpToNExamples	187
8.7.5	Members inherited from class MLDataMetric	187
8.8	Class LabelsetsUpTo5Examples	187
8.8.1	Declaration	187
8.8.2	Constructor summary	187
8.8.3	Constructors	188
8.8.4	Members inherited from class LabelsetsUpToNExamples	188
8.8.5	Members inherited from class MLDataMetric	188
8.9	Class LabelsetsUpToNExamples	188
8.9.1	Declaration	188
8.9.2	All known subclasses	188
8.9.3	Field summary	188
8.9.4	Constructor summary	188
8.9.5	Method summary	188
8.9.6	Fields	189
8.9.7	Constructors	189
8.9.8	Methods	189
8.9.9	Members inherited from class MLDataMetric	189
8.10	Class MeanExamplesPerLabelset	189
8.10.1	Declaration	189
8.10.2	Constructor summary	190
8.10.3	Method summary	190
8.10.4	Constructors	190
8.10.5	Methods	190
8.10.6	Members inherited from class MLDataMetric	190
8.11	Class NumUnconditionalDependentLabelPairsByChiSquare	190
8.11.1	Declaration	190
8.11.2	Constructor summary	191
8.11.3	Method summary	191
8.11.4	Constructors	191
8.11.5	Methods	191
8.11.6	Members inherited from class MLDataMetric	191
8.12	Class ProportionDistinctLabelsets	191

8.12.1	Declaration . . . . .	191
8.12.2	Constructor summary . . . . .	192
8.12.3	Method summary . . . . .	192
8.12.4	Constructors . . . . .	192
8.12.5	Methods . . . . .	192
8.12.6	Members inherited from class MLDataMetric . . . . .	192
8.13	Class RatioLabelsetsUpTo10Examples . . . . .	192
8.13.1	Declaration . . . . .	192
8.13.2	Constructor summary . . . . .	193
8.13.3	Constructors . . . . .	193
8.13.4	Members inherited from class RatioLabelsetsUpToNExamples . . . . .	193
8.13.5	Members inherited from class MLDataMetric . . . . .	193
8.14	Class RatioLabelsetsUpTo2Examples . . . . .	193
8.14.1	Declaration . . . . .	193
8.14.2	Constructor summary . . . . .	193
8.14.3	Constructors . . . . .	193
8.14.4	Members inherited from class RatioLabelsetsUpToNExamples . . . . .	194
8.14.5	Members inherited from class MLDataMetric . . . . .	194
8.15	Class RatioLabelsetsUpTo50Examples . . . . .	194
8.15.1	Declaration . . . . .	194
8.15.2	Constructor summary . . . . .	194
8.15.3	Constructors . . . . .	194
8.15.4	Members inherited from class RatioLabelsetsUpToNExamples . . . . .	194
8.15.5	Members inherited from class MLDataMetric . . . . .	194
8.16	Class RatioLabelsetsUpTo5Examples . . . . .	194
8.16.1	Declaration . . . . .	195
8.16.2	Constructor summary . . . . .	195
8.16.3	Constructors . . . . .	195
8.16.4	Members inherited from class RatioLabelsetsUpToNExamples . . . . .	195
8.16.5	Members inherited from class MLDataMetric . . . . .	195
8.17	Class RatioLabelsetsUpToNExamples . . . . .	195
8.17.1	Declaration . . . . .	195
8.17.2	All known subclasses . . . . .	195
8.17.3	Field summary . . . . .	196
8.17.4	Constructor summary . . . . .	196
8.17.5	Method summary . . . . .	196
8.17.6	Fields . . . . .	196
8.17.7	Constructors . . . . .	196
8.17.8	Methods . . . . .	196
8.17.9	Members inherited from class MLDataMetric . . . . .	196
8.18	Class RatioLabelsetsWithExamplesLessThanHalfAttributes . . . . .	197
8.18.1	Declaration . . . . .	197
8.18.2	Constructor summary . . . . .	197
8.18.3	Method summary . . . . .	197
8.18.4	Constructors . . . . .	197
8.18.5	Methods . . . . .	197

8.18.6	Members inherited from class <code>MLDataMetric</code>	198
8.19	Class <code>RatioUnconditionalDependentLabelPairsByChiSquare</code>	198
8.19.1	Declaration	198
8.19.2	Constructor summary	198
8.19.3	Method summary	198
8.19.4	Constructors	198
8.19.5	Methods	198
8.19.6	Members inherited from class <code>MLDataMetric</code>	199
8.20	Class <code>SCUMBLE</code>	199
8.20.1	Declaration	199
8.20.2	Constructor summary	199
8.20.3	Method summary	199
8.20.4	Constructors	199
8.20.5	Methods	199
8.20.6	Members inherited from class <code>MLDataMetric</code>	200
8.21	Class <code>StdvExamplesPerLabelset</code>	200
8.21.1	Declaration	200
8.21.2	Constructor summary	200
8.21.3	Method summary	200
8.21.4	Constructors	200
8.21.5	Methods	200
8.21.6	Members inherited from class <code>MLDataMetric</code>	201
8.22	Class <code>UniqueLabelsets</code>	201
8.22.1	Declaration	201
8.22.2	Constructor summary	201
8.22.3	Method summary	201
8.22.4	Constructors	201
8.22.5	Methods	201
8.22.6	Members inherited from class <code>MLDataMetric</code>	202
<b>9</b>	<b>Package <code>mldc.metricNames</code></b>	<b>203</b>
9.1	Class <code>AttributesMetrics</code>	203
9.1.1	Declaration	203
9.1.2	Constructor summary	203
9.1.3	Method summary	203
9.1.4	Constructors	204
9.1.5	Methods	204
9.2	Class <code>DimensionalityMetrics</code>	204
9.2.1	Declaration	204
9.2.2	Constructor summary	204
9.2.3	Method summary	204
9.2.4	Constructors	204
9.2.5	Methods	205
9.3	Class <code>ImbalanceMetrics</code>	205
9.3.1	Declaration	205
9.3.2	Constructor summary	205

9.3.3	Method summary . . . . .	205
9.3.4	Constructors . . . . .	205
9.3.5	Methods . . . . .	205
9.4	Class LabelsDistributionMetrics . . . . .	206
9.4.1	Declaration . . . . .	206
9.4.2	Constructor summary . . . . .	206
9.4.3	Method summary . . . . .	206
9.4.4	Constructors . . . . .	206
9.4.5	Methods . . . . .	206
9.5	Class LabelsRelationMetrics . . . . .	206
9.5.1	Declaration . . . . .	206
9.5.2	Constructor summary . . . . .	207
9.5.3	Method summary . . . . .	207
9.5.4	Constructors . . . . .	207
9.5.5	Methods . . . . .	207
<b>10</b>	<b>Package mldc.util . . . . .</b>	<b>208</b>
10.1	Class ImbalancedFeature . . . . .	208
10.1.1	Declaration . . . . .	208
10.1.2	Constructor summary . . . . .	208
10.1.3	Method summary . . . . .	208
10.1.4	Constructors . . . . .	209
10.1.5	Methods . . . . .	210
10.2	Class Utils . . . . .	211
10.2.1	Declaration . . . . .	211
10.2.2	Constructor summary . . . . .	211
10.2.3	Method summary . . . . .	212
10.2.4	Constructors . . . . .	212
10.2.5	Methods . . . . .	212

# Chapter 1

## Introduction

This API implemented in Java provides a wide set of metrics for characterization of multi-label learning (MLL) datasets. Charle defined a taxonomy for characterization metrics of multi-label datasets.<sup>1</sup> Based on this taxonomy also we have considered to include the metrics from Mulan<sup>2</sup> and Meka<sup>3</sup>, and the metrics proposed by Chekina<sup>4</sup>. All the metrics have been grouped in the taxonomy, adding one more group for attributes metrics. The final groups of metrics are: dimensionality, label distribution, relationship among labels, imbalance and attributes.

### 1.1 Structure

The API uses the Mulan and Weka<sup>5</sup> libraries. It is divided in the following packages:

- **base:** it includes the basic classes for dataset characterization. These are *MLDataMetric* and *MLDataCharacterization*. The former is the base implementation for any implemented metric, including the *calculate()* method, which calculates the metric value. The latter is useful to calculate a set of metrics instead of only one.
- **attributes:** it includes the implementation of attributes metrics.
- **dimensionality:** it includes the implementation of dimensionality metrics.
- **imbalance:** it includes the implementation of imbalance metrics.
- **labelsDistribution:** it includes the implementation of labels distribution metrics.
- **labelsRelation:** it includes the implementation of labels relationship metrics.
- **metricNames:** it includes the name of all implemented metrics.
- **util:** it includes some necessary methods for metrics calculation.

---

<sup>1</sup>F. Charle and D. Charle. "A first approach to deal with imbalance in multi-label datasets. In: Lecture Notes in Computer Science, 8073 LNAI (2013), pp. 150-160.

<sup>2</sup>G. Tsoumakas et al. "Mulan: A Java Library for Multi-Label Learning. In: Journal of Machine Learning Research 12 (2011), pp. 2411-2414.

<sup>3</sup>MEKA: A Multi-label Extension to WEKA. <http://meka.sourceforge.net/>. Last accessed: 21-04-2016.

<sup>4</sup>L. Chekina et al. "Meta-learning for selecting a multi-label classification algorithm. In Proceedings of IEEE International Conference on Data Mining, ICDM, 2011, pp. 220-227.

<sup>5</sup>Mark Hall et al. "The WEKA Data Mining Software: An Update". In: SIGKDD Explor. Newsl. 11.1 (2009), pp. 1018.

## 1.2 Examples

The API can be downloaded from [http://www.uco.es/grupos/kdis/kdiswiki/MLLResources/Software/MLDC\\_API\\_v1\\_1.zip](http://www.uco.es/grupos/kdis/kdiswiki/MLLResources/Software/MLDC_API_v1_1.zip). Once downloaded, it has to be included in the Java project. This API has two main goals: calculate one characterization metric for a multi-label dataset or calculate a set of metrics for the same dataset.

To calculate one metric, an object of the desired metric have to be calculated. After creating the metric object, the *calculate()* method have to be called with the multi-label dataset as parameter. The metric value can be obtained in two ways: getting the returned value of the *calculate()* method, or accessing to the metric value with the *getValue()* method. Figure 1.1 shows an example for calculating one metric.

```
1 //Creating the object corresponding to the metric
2 Density density = new Density();
3
4 //Calculating metric value
5 double value = density.calculate(mlData);
6
7 //Other way to get the metric value
8 //After calling calculate() method
9 double value2 = density.getValue();
```

Figure 1.1: Calculating one metric

On the other hand, to calculate a set of metrics instead of only one, the API includes the *MLDataCharacterization* class. To create a *MLDataCharacterization* object it just need the multi-label dataset as parameter. Then, the metrics are added with *addMetric()* or *addMetrics()* methods, passing as parameter a metric or a list of metrics respectively. Once calculated with *calculateMetrics()* method, the *getMetric()* method returns a metric of the list identified by its name. The *getAvailableMetrics()* method returns a set with the names of all available metrics. Figure 1.2 shows an example of how to calculate some metrics for a dataset.



```

1 //Creating object MLDataCharacterization
2 MLDataCharacterization mldc = new MLDataCharacterization(mlData);
3
4 //Including metrics with addMetrics method
5 ArrayList<MLDataMetric> m = new ArrayList<>();
6 m.add(new Attributes());
7 m.add(new Labels());
8 m.add(new Instances());
9 mldc.addMetrics(m);
10
11 //Including metrics with addMetric method
12 mldc.addMetric(new Cardinality());
13 mldc.addMetric(new Density());
14
15 //Calculating
16 mldc.calculateMetrics();
17
18 //Getting values
19 double attributes = mldc.getMetric("Attributes").getValue();
20 double labels = mldc.getMetric("Labels").getValue();
21 double instances = mldc.getMetric("Instances").getValue();
22 double cardinality = mldc.getMetric("Cardinality").getValue();
23 double density = mldc.getMetric("Density").getValue();

```

Figure 1.2: Calculating some metrics

## Chapter 2

# Class Hierarchy

### 2.1 Classes

- `java.lang.Object`
  - `mldc.base.MLDataCharacterization` (in 4.1, page 141)
  - `mldc.base.MLDataMetric` (in 4.2, page 145)
    - `mldc.attributes.AvgAbsoluteCorrelationBetweenNumericAttributes` (in 3.1, page 127)
    - `mldc.attributes.AvgGainRatio` (in 3.2, page 128)
    - `mldc.attributes.BinaryAttributes` (in 3.3, page 129)
    - `mldc.attributes.MeanEntropiesNominalAttributes` (in 3.4, page 130)
    - `mldc.attributes.MeanKurtosis` (in 3.5, page 131)
    - `mldc.attributes.MeanOfMeanOfNumericAttributes` (in 3.6, page 132)
    - `mldc.attributes.MeanSkewnessNumericAttributes` (in 3.7, page 133)
    - `mldc.attributes.MeanStdvNumericAttributes` (in 3.8, page 134)
    - `mldc.attributes.NominalAttributes` (in 3.9, page 135)
    - `mldc.attributes.NumericAttributes` (in 3.10, page 136)
    - `mldc.attributes.ProportionBinaryAttributes` (in 3.11, page 137)
    - `mldc.attributes.ProportionNominalAttributes` (in 3.12, page 138)
    - `mldc.attributes.ProportionNumericAttributes` (in 3.13, page 139)
    - `mldc.attributes.ProportionNumericAttributesWithOutliers` (in 3.14, page 140)
  - `mldc.dimensionality.Attributes` (in 5.1, page 149)
  - `mldc.dimensionality.DistinctLabelsets` (in 5.2, page 150)
  - `mldc.dimensionality.Instances` (in 5.3, page 151)
  - `mldc.dimensionality.Labels` (in 5.4, page 152)
  - `mldc.dimensionality.LxIxF` (in 5.5, page 153)
  - `mldc.dimensionality.RatioInstancesToAttributes` (in 5.6, page 154)
  - `mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)
    - `mldc.imbalance.CVIRInterClass` (in 6.1, page 157)
    - `mldc.imbalance.KurtosisCardinality` (in 6.3, page 159)
    - `mldc.imbalance.MaxIRInterClass` (in 6.4, page 160)
    - `mldc.imbalance.MaxIRIntraClass` (in 6.5, page 161)
    - `mldc.imbalance.MaxIRLabelset` (in 6.6, page 163)
    - `mldc.imbalance.MeanIRInterClass` (in 6.7, page 164)
    - `mldc.imbalance.MeanIRIntraClass` (in 6.8, page 165)

- `mldc.imbalance.MeanIRLabelset` (in 6.9, page 166)
- `mldc.imbalance.MeanStdvIRIntraClass` (in 6.10, page 167)
- `mldc.imbalance.PMax` (in 6.11, page 168)
- `mldc.imbalance.PUniq` (in 6.12, page 169)
- `mldc.imbalance.SkewnessCardinality` (in 6.13, page 171)
- `mldc.labelsDistribution.Cardinality` (in 7.1, page 173)
- `mldc.labelsDistribution.Density` (in 7.2, page 174)
- `mldc.labelsDistribution.MaxEntropy` (in 7.3, page 175)
- `mldc.labelsDistribution.MeanEntropy` (in 7.4, page 176)
- `mldc.labelsDistribution.MinEntropy` (in 7.5, page 177)
- `mldc.labelsDistribution.StdvCardinality` (in 7.6, page 178)
- `mldc.labelsRelation.AvgExamplesPerLabelset` (in 8.1, page 181)
- `mldc.labelsRelation.AvgUnconditionalDependentLabelPairsByChiSquare` (in 8.2, page 182)
- `mldc.labelsRelation.Bound` (in 8.3, page 183)
- `mldc.labelsRelation.Diversity` (in 8.4, page 184)
- `mldc.labelsRelation.LabelsetsUpToNExamples` (in 8.9, page 188)
  - `mldc.labelsRelation.LabelsetsUpTo10Examples` (in 8.5, page 185)
  - `mldc.labelsRelation.LabelsetsUpTo2Examples` (in 8.6, page 186)
  - `mldc.labelsRelation.LabelsetsUpTo50Examples` (in 8.7, page 186)
  - `mldc.labelsRelation.LabelsetsUpTo5Examples` (in 8.8, page 187)
- `mldc.labelsRelation.MeanExamplesPerLabelset` (in 8.10, page 189)
- `mldc.labelsRelation.NumUnconditionalDependentLabelPairsByChiSquare` (in 8.11, page 190)
- `mldc.labelsRelation.ProportionDistinctLabelsets` (in 8.12, page 191)
- `mldc.labelsRelation.RatioLabelsetsUpToNExamples` (in 8.17, page 195)
  - `mldc.labelsRelation.RatioLabelsetsUpTo10Examples` (in 8.13, page 192)
  - `mldc.labelsRelation.RatioLabelsetsUpTo2Examples` (in 8.14, page 193)
  - `mldc.labelsRelation.RatioLabelsetsUpTo50Examples` (in 8.15, page 194)
  - `mldc.labelsRelation.RatioLabelsetsUpTo5Examples` (in 8.16, page 194)
- `mldc.labelsRelation.RatioLabelsetsWithExamplesLessThanHalfAttributes` (in 8.18, page 197)
- `mldc.labelsRelation.RatioUnconditionalDependentLabelPairsByChiSquare` (in 8.19, page 198)
- `mldc.labelsRelation.SCUMBLE` (in 8.20, page 199)
- `mldc.labelsRelation.StdvExamplesPerLabelset` (in 8.21, page 200)
- `mldc.labelsRelation.UniqueLabelsets` (in 8.22, page 201)
- `mldc.metricNames.AttributesMetrics` (in 9.1, page 203)
- `mldc.metricNames.DimensionalityMetrics` (in 9.2, page 204)
- `mldc.metricNames.ImbalanceMetrics` (in 9.3, page 205)
- `mldc.metricNames.LabelsDistributionMetrics` (in 9.4, page 206)
- `mldc.metricNames.LabelsRelationMetrics` (in 9.5, page 206)
- `mldc.util.ImbalancedFeature` (in 10.1, page 208)
- `mldc.util.Utills` (in 10.2, page 211)

## Chapter 3

# Package mldc.attributes

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>AvgAbsoluteCorrelationBetweenNumericAttributes</b> .....	127
Class implementing the Average absolute correlation between numeric at- tributes	
<b>AvgGainRatio</b> .....	128
Class implementing the Average gain ratio	
<b>BinaryAttributes</b> .....	129
Class implementing the Number of binary attributes	
<b>MeanEntropiesNominalAttributes</b> .....	130
Class implementing the Mean of entropies of nominal attributes	
<b>MeanKurtosis</b> .....	131
Class implementing the Mean of kurtosis	
<b>MeanOfMeanOfNumericAttributes</b> .....	132
Class implementing the Mean of mean of numeric attributes	
<b>MeanSkewnessNumericAttributes</b> .....	133
Class implementing the Mean of skewness of numeric attributes	
<b>MeanStdvNumericAttributes</b> .....	134
Class implementing the Mean of standard deviation of numeric attributes	
<b>NominalAttributes</b> .....	135
Class implementing the Number of nominal attributes	
<b>NumericAttributes</b> .....	136
Class implementing the Number of numeric attributes	
<b>ProportionBinaryAttributes</b> .....	137
Class implementing the Proportion of binary attributes	
<b>ProportionNominalAttributes</b> .....	138
Class implementing the Proportion of nominal attributes	
<b>ProportionNumericAttributes</b> .....	139
Class implementing the Proportion of numeric attributes	
<b>ProportionNumericAttributesWithOutliers</b> .....	140
Class implementing the Proportion of numeric attributes with outliers	

## 3.1 Class AvgAbsoluteCorrelationBetweenNumericAttributes

Class implementing the Average absolute correlation between numeric attributes

### 3.1.1 Declaration

```
1 public class AvgAbsoluteCorrelationBetweenNumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.1.2 Constructor summary

AvgAbsoluteCorrelationBetweenNumericAttributes() Constructor

### 3.1.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.1.4 Constructors

- AvgAbsoluteCorrelationBetweenNumericAttributes

```
1 public AvgAbsoluteCorrelationBetweenNumericAttributes()
```

- **Description**  
Constructor

### 3.1.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.1.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.2 Class AvgGainRatio

Class implementing the Average gain ratio

### 3.2.1 Declaration

```
1 public class AvgGainRatio
2 extends mldc.base.MLDataMetric
```

---

### 3.2.2 Constructor summary

AvgGainRatio() Constructor

### 3.2.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.2.4 Constructors

- AvgGainRatio

```
1 public AvgGainRatio()
```

- **Description**  
Constructor

### 3.2.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.2.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.3 Class BinaryAttributes

Class implementing the Number of binary attributes

### 3.3.1 Declaration

```
1 public class BinaryAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.3.2 Constructor summary

BinaryAttributes() Constructor

### 3.3.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.3.4 Constructors

- BinaryAttributes

```
1 public BinaryAttributes()
```

- **Description**  
Constructor

### 3.3.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.3.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.4 Class MeanEntropiesNominalAttributes

Class implementing the Mean of entropies of nominal attributes

### 3.4.1 Declaration

```
1 public class MeanEntropiesNominalAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.4.2 Constructor summary

MeanEntropiesNominalAttributes() Constructor

### 3.4.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.4.4 Constructors

- MeanEntropiesNominalAttributes

```
1 public MeanEntropiesNominalAttributes()
```

- **Description**  
Constructor

### 3.4.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.4.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value



## 3.5 Class MeanKurtosis

Class implementing the Mean of kurtosis

### 3.5.1 Declaration

```
1 public class MeanKurtosis
2 extends mldc.base.MLDataMetric
```

---

### 3.5.2 Constructor summary

MeanKurtosis() Constructor

### 3.5.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.5.4 Constructors

- MeanKurtosis

```
1 public MeanKurtosis()
```

- **Description**  
Constructor

### 3.5.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.5.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.6 Class MeanOfMeanOfNumericAttributes

Class implementing the Mean of mean of numeric attributes

### 3.6.1 Declaration

```
1 public class MeanOfMeanOfNumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.6.2 Constructor summary

MeanOfMeanOfNumericAttributes() Constructor

### 3.6.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.6.4 Constructors

- MeanOfMeanOfNumericAttributes

```
1 public MeanOfMeanOfNumericAttributes()
```

- **Description**  
Constructor

### 3.6.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.6.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.7 Class MeanSkewnessNumericAttributes

Class implementing the Mean of skewness of numeric attributes

### 3.7.1 Declaration

```
1 public class MeanSkewnessNumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.7.2 Constructor summary

MeanSkewnessNumericAttributes() Constructor

### 3.7.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.7.4 Constructors

- MeanSkewnessNumericAttributes

```
1 public MeanSkewnessNumericAttributes()
```

- **Description**  
Constructor

### 3.7.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.7.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.8 Class MeanStdvNumericAttributes

Class implementing the Mean of standard deviation of numeric attributes

### 3.8.1 Declaration

```
1 public class MeanStdvNumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.8.2 Constructor summary

MeanStdvNumericAttributes() Constructor

### 3.8.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.8.4 Constructors

- MeanStdvNumericAttributes

```
1 public MeanStdvNumericAttributes()
```

- **Description**  
Constructor

### 3.8.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.8.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.9 Class NominalAttributes

Class implementing the Number of nominal attributes

### 3.9.1 Declaration

```
1 public class NominalAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.9.2 Constructor summary

NominalAttributes() Constructor

### 3.9.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.9.4 Constructors

- NominalAttributes

```
1 public NominalAttributes()
```

- **Description**  
Constructor

### 3.9.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.9.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.10 Class NumericAttributes

Class implementing the Number of numeric attributes

### 3.10.1 Declaration

```
1 public class NumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.10.2 Constructor summary

NumericAttributes() Constructor

### 3.10.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.10.4 Constructors

- NumericAttributes

```
1 public NumericAttributes()
```

- **Description**  
Constructor

### 3.10.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.10.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.11 Class ProportionBinaryAttributes

Class implementing the Proportion of binary attributes

### 3.11.1 Declaration

```
1 public class ProportionBinaryAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.11.2 Constructor summary

ProportionBinaryAttributes() Constructor

### 3.11.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.11.4 Constructors

- ProportionBinaryAttributes

```
1 public ProportionBinaryAttributes()
```

- **Description**  
Constructor

### 3.11.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.11.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.12 Class ProportionNominalAttributes

Class implementing the Proportion of nominal attributes

### 3.12.1 Declaration

```
1 public class ProportionNominalAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.12.2 Constructor summary

ProportionNominalAttributes() Constructor

### 3.12.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.12.4 Constructors

- ProportionNominalAttributes

```
1 public ProportionNominalAttributes()
```

- **Description**  
Constructor

### 3.12.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.12.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value



## 3.13 Class ProportionNumericAttributes

Class implementing the Proportion of numeric attributes

### 3.13.1 Declaration

```
1 public class ProportionNumericAttributes
2 extends mldc.base.MLDataMetric
```

---

### 3.13.2 Constructor summary

ProportionNumericAttributes() Constructor

### 3.13.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 3.13.4 Constructors

- ProportionNumericAttributes

```
1 public ProportionNumericAttributes()
```

- **Description**  
Constructor

### 3.13.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.13.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 3.14 Class ProportionNumericAttributesWithOutliers

Class implementing the Proportion of numeric attributes with outliers

### 3.14.1 Declaration

```
1 public class ProportionNumericAttributesWithOutliers
2 extends mldc.base.MLDataMetric
```

---

### 3.14.2 Constructor summary

**ProportionNumericAttributesWithOutliers()** Constructor

### 3.14.3 Method summary

**calculate(MultiLabelInstances)** Calculate metric value

### 3.14.4 Constructors

- **ProportionNumericAttributesWithOutliers**

```
1 public ProportionNumericAttributesWithOutliers()
```

- **Description**  
Constructor

### 3.14.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* **mlData** – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 3.14.6 Members inherited from class MLDataMetric

**mldc.base.MLDataMetric** (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

# Chapter 4

## Package mldc.base

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>MLDataCharacterization</b> .....	141
Class for calculating a set of characterization metrics for a multi-label dataset	
<b>MLDataMetric</b> .....	145
Class implementing a metric for multi-label data characterization	

### 4.1 Class MLDataCharacterization

Class for calculating a set of characterization metrics for a multi-label dataset

#### 4.1.1 Declaration

```
1 public class MLDataCharacterization
2 extends java.lang.Object
```

---

#### 4.1.2 Field summary

**availableMetrics** List of available metrics  
**metrics** List of metrics  
**mlData** MultiLabel Dataset

#### 4.1.3 Constructor summary

**MLDataCharacterization(MultiLabelInstances)** Constructor with dataset  
**MLDataCharacterization(MultiLabelInstances, ArrayList)** Constructor with dataset and list of metrics  
**MLDataCharacterization(MultiLabelInstances, MLDataMetric)** Constructor with dataset and metric

#### 4.1.4 Method summary

**addMetric(MLDataMetric)** Add metric to the list  
**addMetrics(ArrayList)** Add metrics to the list  
**calculateMetrics()** Calculate values of all the metrics in the list  
**calculateMetrics(MultiLabelInstances)** Calculate values of all the metrics in the list for a new mlData  
**clear()** Clear metrics list  
**getAvailableMetrics()** return the list of available metrics  
**getMetric(String)** Get metric from the list  
**getMetrics()** Get list of metrics  
**isAvailable(String)** Know if a metric name is available  
**toString()** To String method

#### 4.1.5 Fields

- protected MultiLabelInstances **mlData**
  - MultiLabel Dataset
- protected java.util.ArrayList **metrics**
  - List of metrics
- protected java.lang.String[] **availableMetrics**
  - List of available metrics

#### 4.1.6 Constructors

- **MLDataCharacterization**

```
1 public MLDataCharacterization(MultiLabelInstances mlData)
```

- **Description**

Constructor with dataset

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metrics

- **MLDataCharacterization**

```
1 public MLDataCharacterization(MultiLabelInstances mlData, java.util.ArrayList  
    metrics)
```

- **Description**

Constructor with dataset and list of metrics

- **Parameters**

- \* `mlData` – Multi-label dataset to which calculate the metrics
- \* `metrics` – List of metrics to calculate

- **MLDataCharacterization**

```
1 public MLDataCharacterization(MultiLabelInstances mlData,MLDataMetric metric)
```

- **Description**

Constructor with dataset and metric

- **Parameters**

- \* `mlData` – Multi-label dataset to which calculate the metrics
- \* `metric` – Metric to be added to the list

#### 4.1.7 Methods

- **addMetric**

```
1 public boolean addMetric(MLDataMetric metric)
```

- **Description**

Add metric to the list

- **Parameters**

- \* `metric` – Metric to add to the list

- **Returns** – True if successful added and false otherwise

- **addMetrics**

```
1 public boolean addMetrics(java.util.ArrayList metrics)
```

- **Description**

Add metrics to the list

- **Parameters**

- \* `metrics` – A list of `MLDataMetrics` to add to the current list

- **Returns** – True if all metrics are successfully added and false otherwise

- **calculateMetrics**

```
1 public void calculateMetrics()
```

- **Description**

Calculate values of all the metrics in the list

- **calculateMetrics**

```
1 public void calculateMetrics(MultiLabelInstances mlData)
```

- **Description**

Calculate values of all the metrics in the list for a new mlData

- **Parameters**

\* mlData – Multi-label dataset to which calculate the metric

- **clear**

```
1 public void clear()
```

- **Description**

Clear metrics list

- **getAvailableMetrics**

```
1 public java.lang.String[] getAvailableMetrics()
```

- **Description**

return the list of available metrics

- **Returns** – An array with the names of all the available metrics

- **getMetric**

```
1 public MLDataMetric getMetric(java.lang.String metricName)
```

- **Description**

Get metric from the list

- **Parameters**

- \* **metricName** – Name of the metric to get
- **Returns** – A `MLDataMetric` object with the metric required

- **getMetrics**

```
1 public java.util.ArrayList getMetrics()
```

- **Description**  
Get list of metrics
- **Returns** – A list with the metrics of the object

- **isAvailable**

```
1 public boolean isAvailable(java.lang.String metricName)
```

- **Description**  
Know if a metric name is available
- **Parameters**  
\* **metricName** – Name of the metric
- **Returns** – True if it is available and false otherwise

- **toString**

```
1 public java.lang.String toString()
```

- **Description**  
To String method
- **Returns** – All metrics as a String with name and value, separated by ”n”

## 4.2 Class `MLDataMetric`

Class implementing a metric for multi-label data characterization

### 4.2.1 Declaration

```
1 public class MLDataMetric
2 extends java.lang.Object implements java.lang.Comparable
```

---

### 4.2.2 All known subclasses

ProportionNumericAttributesWithOutliers (in 3.14, page 140), ProportionNumericAttributes (in 3.13, page 139), ProportionNominalAttributes (in 3.12, page 138), ProportionBinaryAttributes (in 3.11, page 137), NumericAttributes (in 3.10, page 136), NominalAttributes (in 3.9, page 135), MeanStdvNumericAttributes (in 3.8, page 134), MeanSkewnessNumericAttributes (in 3.7, page 133), MeanOfMeanOfNumericAttributes (in 3.6, page 132), MeanKurtosis (in 3.5, page 131), MeanEntropiesNominalAttributes (in 3.4, page 130), BinaryAttributes (in 3.3, page 129), AvgGainRatio (in 3.2, page 128), AvgAbsoluteCorrelationBetweenNumericAttributes (in 3.1, page 127), RatioInstancesToAttributes (in 5.6, page 154), LxIxF (in 5.5, page 153), Labels (in 5.4, page 152), Instances (in 5.3, page 151), DistinctLabelsets (in 5.2, page 150), Attributes (in 5.1, page 149), SkewnessCardinality (in 6.13, page 171), PUniq (in 6.12, page 169), PMax (in 6.11, page 168), MeanStdvIRIntraClass (in 6.10, page 167), MeanIRLabelset (in 6.9, page 166), MeanIRIntraClass (in 6.8, page 165), MeanIRInterClass (in 6.7, page 164), MaxIRLabelset (in 6.6, page 163), MaxIRIntraClass (in 6.5, page 161), MaxIRInterClass (in 6.4, page 160), KurtosisCardinality (in 6.3, page 159), ImbalanceDataMetric (in 6.2, page 158), CVIRInterClass (in 6.1, page 157), StdvCardinality (in 7.6, page 178), MinEntropy (in 7.5, page 177), MeanEntropy (in 7.4, page 176), MaxEntropy (in 7.3, page 175), Density (in 7.2, page 174), Cardinality (in 7.1, page 173), UniqueLabelsets (in 8.22, page 201), StdvExamplesPerLabelset (in 8.21, page 200), SCUMBLE (in 8.20, page 199), RatioUnconditionalDependentLabelPairsByChiSquare (in 8.19, page 198), RatioLabelsetsWithExamplesLessThanHalfAttributes (in 8.18, page 197), RatioLabelsetsUpToNExamples (in 8.17, page 195), RatioLabelsetsUpTo5Examples (in 8.16, page 194), RatioLabelsetsUpTo50Examples (in 8.15, page 194), RatioLabelsetsUpTo2Examples (in 8.14, page 193), RatioLabelsetsUpTo10Examples (in 8.13, page 192), ProportionDistinctLabelsets (in 8.12, page 191), NumUnconditionalDependentLabelPairsByChiSquare (in 8.11, page 190), MeanExamplesPerLabelset (in 8.10, page 189), LabelsetsUpToNExamples (in 8.9, page 188), LabelsetsUpTo5Examples (in 8.8, page 187), LabelsetsUpTo50Examples (in 8.7, page 186), LabelsetsUpTo2Examples (in 8.6, page 186), LabelsetsUpTo10Examples (in 8.5, page 185), Diversity (in 8.4, page 184), Bound (in 8.3, page 183), AvgUnconditionalDependentLabelPairsByChiSquare (in 8.2, page 182), AvgExamplesPerLabelset (in 8.1, page 181)

### 4.2.3 Field summary

**name** Metric name  
**value** Metric value

### 4.2.4 Constructor summary

**MLDataMetric(String)** Constructor

### 4.2.5 Method summary

**calculate(MultiLabelInstances)** Calculate metric value.  
**compareTo(MLDataMetric)**  
**getName()** Get metric name  
**getValue()** Get metric value  
**toString()** To String method



#### 4.2.6 Fields

- protected java.lang.String **name**
  - Metric name
- protected double **value**
  - Metric value

#### 4.2.7 Constructors

- **MLDataMetric**

```
1 public MLDataMetric(java.lang.String name)
```

- **Description**  
Constructor
- **Parameters**
  - \* **name** – Name of the metric

#### 4.2.8 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value. To be implemented in each metric
- **Parameters**
  - \* **mlData** – Multi-label dataset to which calculate the metric
- **Returns** – Calculated value of the metric

- **compareTo**

```
1 public int compareTo(MLDataMetric other)
```

- **getName**

```
1 public java.lang.String getName()
```

- **Description**  
Get metric name
- **Returns** – Name of the metric

- **getValue**

```
1 public double getValue()
```

- **Description**  
Get metric value
- **Returns** – Value of the metric

- **toString**

```
1 public java.lang.String toString()
```

- **Description**  
To String method
- **Returns** – MLDataMetric as String, including name and value

## Chapter 5

# Package mldc.dimensionality

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>Attributes</b> .....	149
Class implementing the Attributes metric	
<b>DistinctLabelsets</b> .....	150
Class implementing the Distinct labelsets metric	
<b>Instances</b> .....	151
Class implementing the Instances metric	
<b>Labels</b> .....	152
Class implementing the Labels metric	
<b>LxIxF</b> .....	153
Class implementing the LxIxF metric	
<b>RatioInstancesToAttributes</b> .....	154
Class implementing the Ratio of number of instances to the number of at- tributes	

### 5.1 Class Attributes

Class implementing the Attributes metric

#### 5.1.1 Declaration

```
1 public class Attributes
2 extends mldc.base.MLDataMetric
```

---

#### 5.1.2 Constructor summary

Attributes()

#### 5.1.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 5.1.4 Constructors

- **Attributes**

```
1 public Attributes()
```

### 5.1.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 5.1.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 5.2 Class `DistinctLabelsets`

Class implementing the Distinct labelsets metric

### 5.2.1 Declaration

```
1 public class DistinctLabelsets
2 extends mldc.base.MLDataMetric
```

---

### 5.2.2 Constructor summary

`DistinctLabelsets()`

### 5.2.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 5.2.4 Constructors

- **DistinctLabelsets**

```
1 public DistinctLabelsets()
```

### 5.2.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 5.2.6 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 5.3 Class Instances

Class implementing the Instances metric

### 5.3.1 Declaration

```
1 public class Instances
2 extends mldc.base.MLDataMetric
```

---

### 5.3.2 Constructor summary

`Instances()`

### 5.3.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 5.3.4 Constructors

- **Instances**

```
1 public Instances()
```

### 5.3.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 5.3.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 5.4 Class Labels

Class implementing the Labels metric

### 5.4.1 Declaration

```
1 public class Labels
2 extends mldc.base.MLDataMetric
```

---

### 5.4.2 Constructor summary

`Labels()`

### 5.4.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

#### 5.4.4 Constructors

- **Labels**

```
1 public Labels()
```

#### 5.4.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

#### 5.4.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

### 5.5 Class `LxIxF`

Class implementing the `LxIxF` metric

#### 5.5.1 Declaration

```
1 public class LxIxF
2 extends mldc.base.MLDataMetric
```

---

#### 5.5.2 Constructor summary

`LxIxF()`

#### 5.5.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 5.5.4 Constructors

- **LxIxF**

```
1 public LxIxF()
```

### 5.5.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 5.5.6 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 5.6 Class RatioInstancesToAttributes

Class implementing the Ratio of number of instances to the number of attributes

### 5.6.1 Declaration

```
1 public class RatioInstancesToAttributes
2 extends mldc.base.MLDataMetric
```

---

### 5.6.2 Constructor summary

`RatioInstancesToAttributes()`

### 5.6.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value



### 5.6.4 Constructors

- **RatioInstancesToAttributes**

```
1 public RatioInstancesToAttributes()
```

### 5.6.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 5.6.6 Members inherited from class **MLDataMetric**

**mldc.base.MLDataMetric** (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## Chapter 6

# Package mldc.imbalance

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>CVIRInterClass</b> .....	157
Class implementing the CVIR inter class	
<b>ImbalanceDataMetric</b> .....	158
Class for all Imbalance Metrics including characteristics for imbalanced data	
<b>KurtosisCardinality</b> .....	159
Class implementing the Kurtosis cardinality	
<b>MaxIRInterClass</b> .....	160
Class implementing the Max IR inter class	
<b>MaxIRIntraClass</b> .....	161
Class implementing the Max IR intra class	
<b>MaxIRLabelset</b> .....	163
Class implementing the Max IR per labelset	
<b>MeanIRInterClass</b> .....	164
Class implementing the Mean of IR inter class	
<b>MeanIRIntraClass</b> .....	165
Class implementing the Mean of IR intra class	
<b>MeanIRLabelset</b> .....	166
Class implementing the Mean of IR per labelset	
<b>MeanStdvIRIntraClass</b> .....	167
Class implementing the Mean of standard deviation of IR intra class	
<b>PMax</b> .....	168
Class implementing the Proportion of maxim label combination (PMax)	
<b>PUniq</b> .....	169
Class implementing the Proportion of unique label combination (PUniq)	
<b>SkewnessCardinality</b> .....	171
Class implementing the Skewness cardinality	

## 6.1 Class CVIRInterClass

Class implementing the CVIR inter class

### 6.1.1 Declaration

```
1 public class CVIRInterClass
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.1.2 Constructor summary

CVIRInterClass() Constructor

### 6.1.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.1.4 Constructors

- CVIRInterClass

```
1 public CVIRInterClass()
```

- **Description**  
Constructor

### 6.1.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.1.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)  
calculate, imbalancedData

### 6.1.7 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.2 Class ImbalanceDataMetric

Class for all Imbalance Metrics including characteristics for imbalanced data

### 6.2.1 Declaration

```
1 public class ImbalanceDataMetric
2 extends mldc.base.MLDataMetric
```

---

### 6.2.2 All known subclasses

`SkewnessCardinality` (in 6.13, page 171), `PUniq` (in 6.12, page 169), `PMax` (in 6.11, page 168), `MeanStdvIRIntraClass` (in 6.10, page 167), `MeanIRLabelset` (in 6.9, page 166), `MeanIRIntraClass` (in 6.8, page 165), `MeanIRInterClass` (in 6.7, page 164), `MaxIRLabelset` (in 6.6, page 163), `MaxIRIntraClass` (in 6.5, page 161), `MaxIRInterClass` (in 6.4, page 160), `KurtosisCardinality` (in 6.3, page 159), `CVIRInterClass` (in 6.1, page 157)

### 6.2.3 Field summary

`imbalancedData`

### 6.2.4 Constructor summary

`ImbalanceDataMetric(String)` Constructor

### 6.2.5 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.2.6 Fields

- `protected mldc.util.ImbalancedFeature[] imbalancedData`

### 6.2.7 Constructors

- `ImbalanceDataMetric`

```
1 public ImbalanceDataMetric(java.lang.String name)
```

- **Description**  
Constructor
- **Parameters**
  - \* `name` – Metric name

### 6.2.8 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.2.9 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)  
`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.3 Class `KurtosisCardinality`

Class implementing the Kurtosis cardinality

### 6.3.1 Declaration

```
1 public class KurtosisCardinality
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.3.2 Constructor summary

`KurtosisCardinality()` Constructor

### 6.3.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.3.4 Constructors

- **KurtosisCardinality**

```
1 public KurtosisCardinality()
```

- **Description**  
Constructor

### 6.3.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.3.6 Members inherited from class `ImbalanceDataMetric`

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)  
calculate, imbalancedData

### 6.3.7 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

## 6.4 Class `MaxIRInterClass`

Class implementing the Max IR inter class

### 6.4.1 Declaration

```
1 public class MaxIRInterClass  
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.4.2 Constructor summary

`MaxIRInterClass()` Constructor

### 6.4.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.4.4 Constructors

- `MaxIRInterClass`

```
1 public MaxIRInterClass()
```

- **Description**

Constructor

### 6.4.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* `mlData` – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 6.4.6 Members inherited from class `ImbalanceDataMetric`

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)

`calculate`, `imbalancedData`

### 6.4.7 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.5 Class `MaxIRIntraClass`

Class implementing the Max IR intra class

### 6.5.1 Declaration

```
1 public class MaxIRIntraClass
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.5.2 Constructor summary

MaxIRIntraClass() Constructor

### 6.5.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.5.4 Constructors

- MaxIRIntraClass

```
1 public MaxIRIntraClass()
```

- **Description**  
Constructor

### 6.5.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.5.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)  
calculate, imbalancedData

### 6.5.7 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value



## 6.6 Class MaxIRLabelset

Class implementing the Max IR per labelset

### 6.6.1 Declaration

```
1 public class MaxIRLabelset
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.6.2 Constructor summary

MaxIRLabelset() Constructor

### 6.6.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.6.4 Constructors

- MaxIRLabelset

```
1 public MaxIRLabelset()
```

- **Description**  
Constructor

### 6.6.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.6.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)  
calculate, imbalancedData

### 6.6.7 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.7 Class `MeanIRInterClass`

Class implementing the Mean of IR inter class

### 6.7.1 Declaration

```
1 public class MeanIRInterClass
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.7.2 Constructor summary

`MeanIRInterClass()` Constructor

### 6.7.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.7.4 Constructors

- `MeanIRInterClass`

```
1 public MeanIRInterClass()
```

– **Description**  
Constructor

### 6.7.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**  
Calculate metric value

– **Parameters**

\* `mlData` – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 6.7.6 Members inherited from class ImbalanceDataMetric

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)  
calculate, imbalancedData

### 6.7.7 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

## 6.8 Class MeanIRIntraClass

Class implementing the Mean of IR intra class

### 6.8.1 Declaration

```
1 public class MeanIRIntraClass
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.8.2 Constructor summary

`MeanIRIntraClass()` Constructor

### 6.8.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.8.4 Constructors

- `MeanIRIntraClass`

```
1 public MeanIRIntraClass()
```

– **Description**  
Constructor

### 6.8.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

- \* `mldata` – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 6.8.6 Members inherited from class `ImbalanceDataMetric`

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)

`calculate`, `imbalancedData`

### 6.8.7 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.9 Class `MeanIRLabelset`

Class implementing the Mean of IR per labelset

### 6.9.1 Declaration

```
1 public class MeanIRLabelset
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.9.2 Constructor summary

`MeanIRLabelset()` Constructor

### 6.9.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 6.9.4 Constructors

- `MeanIRLabelset`

```
1 public MeanIRLabelset()
```

- **Description**

Constructor

### 6.9.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**

Calculate metric value

– **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 6.9.6 Members inherited from class ImbalanceDataMetric

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)

`calculate`, `imbalancedData`

### 6.9.7 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 6.10 Class MeanStdvIRIntraClass

Class implementing the Mean of standard deviation of IR intra class

### 6.10.1 Declaration

```
1 public class MeanStdvIRIntraClass
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.10.2 Constructor summary

`MeanStdvIRIntraClass()` Constructor

### 6.10.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

#### 6.10.4 Constructors

- **MeanStdvIRIntraClass**

```
1 public MeanStdvIRIntraClass()
```

- **Description**  
Constructor

#### 6.10.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* **mlData** – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

#### 6.10.6 Members inherited from class ImbalanceDataMetric

`mldc.imbalance.ImbalanceDataMetric` (in 6.2, page 158)  
calculate, imbalancedData

#### 6.10.7 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

### 6.11 Class PMax

Class implementing the Proportion of maxim label combination (PMax)

#### 6.11.1 Declaration

```
1 public class PMax
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.11.2 Constructor summary

PMax() Constructor

### 6.11.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.11.4 Constructors

- PMax

```
1 public PMax()
```

– **Description**

Constructor

### 6.11.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**

Calculate metric value

– **Parameters**

\* mlData – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 6.11.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)

calculate, imbalancedData

### 6.11.7 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 6.12 Class PUniq

Class implementing the Proportion of unique label combination (PUniq)

### 6.12.1 Declaration

```
1 public class PUniq
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.12.2 Constructor summary

PUniq() Constructor

### 6.12.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.12.4 Constructors

- PUniq

```
1 public PUniq()
```

- **Description**  
Constructor

### 6.12.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mldata)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mldata – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.12.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)  
calculate, imbalancedData

### 6.12.7 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value



## 6.13 Class SkewnessCardinality

Class implementing the Skewness cardinality

### 6.13.1 Declaration

```
1 public class SkewnessCardinality
2 extends mldc.imbalance.ImbalanceDataMetric
```

---

### 6.13.2 Constructor summary

SkewnessCardinality() Constructor

### 6.13.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 6.13.4 Constructors

- SkewnessCardinality

```
1 public SkewnessCardinality()
```

- **Description**  
Constructor

### 6.13.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 6.13.6 Members inherited from class ImbalanceDataMetric

mldc.imbalance.ImbalanceDataMetric (in 6.2, page 158)  
calculate, imbalancedData

### 6.13.7 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

# Chapter 7

## Package mldc.labelsDistribution

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>Cardinality</b> ..... 173	
Class implementing the Cardinality	
<b>Density</b> ..... 174	
Class implementing the Density	
<b>MaxEntropy</b> ..... 175	
Class implementing the Maximal entropy of labels	
<b>MeanEntropy</b> ..... 176	
Class implementing the Mean of entropies of labels	
<b>MinEntropy</b> ..... 177	
Class implementing the Minimal entropy of labels	
<b>StdvCardinality</b> ..... 178	
Class implementing the Standard deviation of label cardinality	

### 7.1 Class Cardinality

Class implementing the Cardinality

#### 7.1.1 Declaration

```
1 public class Cardinality
2 extends mldc.base.MLDataMetric
```

---

#### 7.1.2 Constructor summary

Cardinality() Constructor

#### 7.1.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 7.1.4 Constructors

- Cardinality

```
1 public Cardinality()
```

- **Description**  
Constructor

### 7.1.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 7.1.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 7.2 Class Density

Class implementing the Density

### 7.2.1 Declaration

```
1 public class Density
2 extends mldc.base.MLDataMetric
```

---

### 7.2.2 Constructor summary

Density() Constructor

### 7.2.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 7.2.4 Constructors

- Density

```
1 public Density()
```

- **Description**  
Constructor

### 7.2.5 Methods

- calculate

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* mlData – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 7.2.6 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 7.3 Class MaxEntropy

Class implementing the Maximal entropy of labels

### 7.3.1 Declaration

```
1 public class MaxEntropy
2 extends mldc.base.MLDataMetric
```

---

### 7.3.2 Constructor summary

MaxEntropy() Constructor

### 7.3.3 Method summary

calculate(MultiLabelInstances) Calculate metric value

### 7.3.4 Constructors

- **MaxEntropy**

```
1 public MaxEntropy()
```

- **Description**  
Constructor

### 7.3.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 7.3.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 7.4 Class `MeanEntropy`

Class implementing the Mean of entropies of labels

### 7.4.1 Declaration

```
1 public class MeanEntropy
2 extends mldc.base.MLDataMetric
```

---

### 7.4.2 Constructor summary

`MeanEntropy()` Constructor

### 7.4.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

#### 7.4.4 Constructors

- **MeanEntropy**

```
1 public MeanEntropy()
```

- **Description**  
Constructor

#### 7.4.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

#### 7.4.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

### 7.5 Class `MinEntropy`

Class implementing the Minimal entropy of labels

#### 7.5.1 Declaration

```
1 public class MinEntropy
2 extends mldc.base.MLDataMetric
```

---

#### 7.5.2 Constructor summary

`MinEntropy()` Constructor

#### 7.5.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

#### 7.5.4 Constructors

- **MinEntropy**

```
1 public MinEntropy()
```

- **Description**  
Constructor

#### 7.5.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

#### 7.5.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

### 7.6 Class `StdvCardinality`

Class implementing the Standard deviation of label cardinality

#### 7.6.1 Declaration

```
1 public class StdvCardinality
2 extends mldc.base.MLDataMetric
```

---

#### 7.6.2 Constructor summary

`StdvCardinality()`

#### 7.6.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value



#### 7.6.4 Constructors

- **StdvCardinality**

```
1 public StdvCardinality()
```

#### 7.6.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

#### 7.6.6 Members inherited from class **MLDataMetric**

**mldc.base.MLDataMetric** (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## Chapter 8

# Package mldc.labelsRelation

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>AvgExamplesPerLabelset</b> .....	181
Class implementing the Average examples per labelset	
<b>AvgUnconditionalDependentLabelPairsByChiSquare</b> .....	182
Class implementing the Average of unconditionally dependent label pairs by chi-square test	
<b>Bound</b> .....	183
Class implementing the Bound	
<b>Diversity</b> .....	184
Class implementing the Diversity	
<b>LabelsetsUpTo10Examples</b> .....	185
Class implementing the Number of labelsets up to 10 examples	
<b>LabelsetsUpTo2Examples</b> .....	186
Class implementing the Number of labelsets up to 2 examples	
<b>LabelsetsUpTo50Examples</b> .....	186
Class implementing the Number of labelsets up to 50 examples	
<b>LabelsetsUpTo5Examples</b> .....	187
Class implementing the Number of labelsets up to 5 examples	
<b>LabelsetsUpToNExamples</b> .....	188
Class implementing the Number of labelsets up to N examples	
<b>MeanExamplesPerLabelset</b> .....	189
Class implementing the Mean examples per labelset	
<b>NumUnconditionalDependentLabelPairsByChiSquare</b> .....	190
Class implementing the Number of unconditionally dependent label pairs by chi-square test	
<b>ProportionDistinctLabelsets</b> .....	191
Class implementing the Proportion of distinct labelsets	
<b>RatioLabelsetsUpTo10Examples</b> .....	192
Class implementing the Ratio of number of labelsets up to 10 examples	
<b>RatioLabelsetsUpTo2Examples</b> .....	193
Class implementing the Ratio of number of labelsets up to 2 examples	

<b>RatioLabelsetsUpTo50Examples</b> .....	194
Class implementing the Ratio of number of labelsets up to 50 examples	
<b>RatioLabelsetsUpTo5Examples</b> .....	194
Class implementing the Ratio of number of labelsets up to 5 examples	
<b>RatioLabelsetsUpToNExamples</b> .....	195
Class implementing the Ratio of number of labelsets up to N examples	
<b>RatioLabelsetsWithExamplesLessThanHalfAttributes</b> .....	197
Class implementing the Ratio of labelsets with number of examples less than half of the attributes	
<b>RatioUnconditionalDependentLabelPairsByChiSquare</b> .....	198
Class implementing the Ratio of unconditionally dependent label pairs by chi-square test	
<b>SCUMBLE</b> .....	199
Class implementing the SCUMBLE	
<b>StdvExamplesPerLabelset</b> .....	200
Class implementing the Standard deviation of examples per labelset	
<b>UniqueLabelsets</b> .....	201
Class implementing the Number of unique labelsets	

## 8.1 Class AvgExamplesPerLabelset

Class implementing the Average examples per labelset

### 8.1.1 Declaration

```

1 public class AvgExamplesPerLabelset
2 extends mldc.base.MLDataMetric

```

---

### 8.1.2 Constructor summary

**AvgExamplesPerLabelset()** Constructor

### 8.1.3 Method summary

**calculate(MultiLabelInstances)** Calculate metric value

### 8.1.4 Constructors

- **AvgExamplesPerLabelset**

```

1 public AvgExamplesPerLabelset ()

```

#### – Description

Constructor

### 8.1.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**

Calculate metric value

– **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.1.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.2 Class `AvgUnconditionalDependentLabelPairsByChiSquare`

Class implementing the Average of unconditionally dependent label pairs by chi-square test

### 8.2.1 Declaration

```
1 public class AvgUnconditionalDependentLabelPairsByChiSquare
2 extends mldc.base.MLDataMetric
```

---

### 8.2.2 Constructor summary

`AvgUnconditionalDependentLabelPairsByChiSquare()` Constructor

### 8.2.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.2.4 Constructors

- **`AvgUnconditionalDependentLabelPairsByChiSquare`**

```
1 public AvgUnconditionalDependentLabelPairsByChiSquare()
```

– **Description**

Constructor

### 8.2.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**

Calculate metric value

– **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.2.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.3 Class Bound

Class implementing the Bound

### 8.3.1 Declaration

```
1 public class Bound
2 extends mldc.base.MLDataMetric
```

---

### 8.3.2 Constructor summary

`Bound()` Constructor

### 8.3.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.3.4 Constructors

- **Bound**

```
1 public Bound()
```

– **Description**

Constructor

### 8.3.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 8.3.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.4 Class Diversity

Class implementing the Diversity

### 8.4.1 Declaration

```
1 public class Diversity
2 extends mldc.base.MLDataMetric
```

---

### 8.4.2 Constructor summary

`Diversity()` Constructor

### 8.4.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.4.4 Constructors

- **Diversity**

```
1 public Diversity()
```

- **Description**

Constructor

### 8.4.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**

Calculate metric value

– **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.4.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.5 Class `LabelsetsUpTo10Examples`

Class implementing the Number of labelsets up to 10 examples

### 8.5.1 Declaration

```
1 public class LabelsetsUpTo10Examples
2 extends mldc.labelsRelation.LabelsetsUpToNExamples
```

---

### 8.5.2 Constructor summary

`LabelsetsUpTo10Examples()` Constructor

### 8.5.3 Constructors

- **LabelsetsUpTo10Examples**

```
1 public LabelsetsUpTo10Examples()
```

– **Description**

Constructor

### 8.5.4 Members inherited from class `LabelsetsUpToNExamples`

`mldc.labelsRelation.LabelsetsUpToNExamples` (in 8.9, page 188)

`calculate`, `n`

### 8.5.5 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 8.6 Class `LabelsetsUpTo2Examples`

Class implementing the Number of labelsets up to 2 examples

### 8.6.1 Declaration

```
1 public class LabelsetsUpTo2Examples
2 extends mldc.labelsRelation.LabelsetsUpToNExamples
```

---

### 8.6.2 Constructor summary

`LabelsetsUpTo2Examples()` Constructor

### 8.6.3 Constructors

- `LabelsetsUpTo2Examples`

```
1 public LabelsetsUpTo2Examples()
```

#### – Description

Constructor

### 8.6.4 Members inherited from class `LabelsetsUpToNExamples`

`mldc.labelsRelation.LabelsetsUpToNExamples` (in 8.9, page 188)

calculate, n

### 8.6.5 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 8.7 Class `LabelsetsUpTo50Examples`

Class implementing the Number of labelsets up to 50 examples



### 8.7.1 Declaration

```
1 public class LabelsetsUpTo50Examples
2 extends mldc.labelsRelation.LabelsetsUpToNExamples
```

---

### 8.7.2 Constructor summary

LabelsetsUpTo50Examples() Constructor

### 8.7.3 Constructors

- LabelsetsUpTo50Examples

```
1 public LabelsetsUpTo50Examples()
```

– **Description**  
Constructor

### 8.7.4 Members inherited from class LabelsetsUpToNExamples

mldc.labelsRelation.LabelsetsUpToNExamples (in 8.9, page 188)  
calculate, n

### 8.7.5 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

## 8.8 Class LabelsetsUpTo5Examples

Class implementing the Number of labelsets up to 5 examples

### 8.8.1 Declaration

```
1 public class LabelsetsUpTo5Examples
2 extends mldc.labelsRelation.LabelsetsUpToNExamples
```

---

### 8.8.2 Constructor summary

LabelsetsUpTo5Examples() Constructor

### 8.8.3 Constructors

- **LabelsetsUpTo5Examples**

```
1 public LabelsetsUpTo5Examples()
```

#### – Description

Constructor

### 8.8.4 Members inherited from class LabelsetsUpToNExamples

`mldc.labelsRelation.LabelsetsUpToNExamples` (in 8.9, page 188)  
calculate, n

### 8.8.5 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

## 8.9 Class LabelsetsUpToNExamples

Class implementing the Number of labelsets up to N examples

### 8.9.1 Declaration

```
1 public class LabelsetsUpToNExamples
2 extends mldc.base.MLDataMetric
```

---

### 8.9.2 All known subclasses

`LabelsetsUpTo5Examples` (in 8.8, page 187), `LabelsetsUpTo50Examples` (in 8.7, page 186), `LabelsetsUpTo2Examples` (in 8.6, page 186), `LabelsetsUpTo10Examples` (in 8.5, page 185)

### 8.9.3 Field summary

n

### 8.9.4 Constructor summary

`LabelsetsUpToNExamples(int)` Constructor

### 8.9.5 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.9.6 Fields

- protected int **n**

### 8.9.7 Constructors

- **LabelsetsUpToNExamples**

```
1 public LabelsetsUpToNExamples(int n)
```

- **Description**

Constructor

- **Parameters**

\* **n** – Number of examples

### 8.9.8 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* **mlData** – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 8.9.9 Members inherited from class MLDataMetric

mldc.base.MLDataMetric (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 8.10 Class MeanExamplesPerLabelset

Class implementing the Mean examples per labelset

### 8.10.1 Declaration

```
1 public class MeanExamplesPerLabelset
2 extends mldc.base.MLDataMetric
```

---

### 8.10.2 Constructor summary

`MeanExamplesPerLabelset()` Constructor

### 8.10.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.10.4 Constructors

- **MeanExamplesPerLabelset**

```
1 public MeanExamplesPerLabelset ()
```

– **Description**  
Constructor

### 8.10.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**  
Calculate metric value

– **Parameters**  
\* `mlData` – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.10.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.11 Class `NumUnconditionalDependentLabelPairsByChiSquare`

Class implementing the Number of unconditionally dependent label pairs by chi-square test

### 8.11.1 Declaration

```
1 public class NumUnconditionalDependentLabelPairsByChiSquare
2 extends mldc.base.MLDataMetric
```

---

### 8.11.2 Constructor summary

`NumUnconditionalDependentLabelPairsByChiSquare()` Constructor

### 8.11.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.11.4 Constructors

- **NumUnconditionalDependentLabelPairsByChiSquare**

```
1 public NumUnconditionalDependentLabelPairsByChiSquare()
```

– **Description**  
Constructor

### 8.11.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**  
Calculate metric value

– **Parameters**  
\* `mlData` – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.11.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.12 Class `ProportionDistinctLabelsets`

Class implementing the Proportion of distinct labelsets

### 8.12.1 Declaration

```
1 public class ProportionDistinctLabelsets
2 extends mldc.base.MLDataMetric
```

---

### 8.12.2 Constructor summary

`ProportionDistinctLabelsets()` Constructor

### 8.12.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.12.4 Constructors

- **ProportionDistinctLabelsets**

```
1 public ProportionDistinctLabelsets()
```

– **Description**  
Constructor

### 8.12.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

– **Description**  
Calculate metric value

– **Parameters**  
\* `mlData` – Multi-label dataset to which calculate the metric

– **Returns** – Value of the metric

### 8.12.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.13 Class `RatioLabelsetsUpTo10Examples`

Class implementing the Ratio of number of labelsets up to 10 examples

### 8.13.1 Declaration

```
1 public class RatioLabelsetsUpTo10Examples
2 extends mldc.labelsRelation.RatioLabelsetsUpToNExamples
```

---

### 8.13.2 Constructor summary

`RatioLabelsetsUpTo10Examples()` Constructor

### 8.13.3 Constructors

- `RatioLabelsetsUpTo10Examples`

```
1 public RatioLabelsetsUpTo10Examples()
```

- **Description**  
Constructor

### 8.13.4 Members inherited from class `RatioLabelsetsUpToNExamples`

`mldc.labelsRelation.RatioLabelsetsUpToNExamples` (in 8.17, page 195)  
`calculate, n`

### 8.13.5 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)  
`calculate, compareTo, getName, getValue, name, toString, value`

## 8.14 Class `RatioLabelsetsUpTo2Examples`

Class implementing the Ratio of number of labelsets up to 2 examples

### 8.14.1 Declaration

```
1 public class RatioLabelsetsUpTo2Examples
2 extends mldc.labelsRelation.RatioLabelsetsUpToNExamples
```

---

### 8.14.2 Constructor summary

`RatioLabelsetsUpTo2Examples()` Constructor

### 8.14.3 Constructors

- `RatioLabelsetsUpTo2Examples`

```
1 public RatioLabelsetsUpTo2Examples()
```

- **Description**  
Constructor

#### 8.14.4 Members inherited from class `RatioLabelsetsUpToNExamples`

`mldc.labelsRelation.RatioLabelsetsUpToNExamples` (in 8.17, page 195)  
calculate, n

#### 8.14.5 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

### 8.15 Class `RatioLabelsetsUpTo50Examples`

Class implementing the Ratio of number of labelsets up to 50 examples

#### 8.15.1 Declaration

```
1 public class RatioLabelsetsUpTo50Examples
2 extends mldc.labelsRelation.RatioLabelsetsUpToNExamples
```

---

#### 8.15.2 Constructor summary

`RatioLabelsetsUpTo50Examples()` Constructor

#### 8.15.3 Constructors

- `RatioLabelsetsUpTo50Examples`

```
1 public RatioLabelsetsUpTo50Examples()
```

– **Description**  
Constructor

#### 8.15.4 Members inherited from class `RatioLabelsetsUpToNExamples`

`mldc.labelsRelation.RatioLabelsetsUpToNExamples` (in 8.17, page 195)  
calculate, n

#### 8.15.5 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

### 8.16 Class `RatioLabelsetsUpTo5Examples`

Class implementing the Ratio of number of labelsets up to 5 examples



### 8.16.1 Declaration

```
1 public class RatioLabelsetsUpTo5Examples
2 extends mldc.labelsRelation.RatioLabelsetsUpToNExamples
```

---

### 8.16.2 Constructor summary

**RatioLabelsetsUpTo5Examples()** Constructor

### 8.16.3 Constructors

- **RatioLabelsetsUpTo5Examples**

```
1 public RatioLabelsetsUpTo5Examples()
```

– **Description**  
Constructor

### 8.16.4 Members inherited from class **RatioLabelsetsUpToNExamples**

**mldc.labelsRelation.RatioLabelsetsUpToNExamples** (in 8.17, page 195)  
calculate, n

### 8.16.5 Members inherited from class **MLDataMetric**

**mldc.base.MLDataMetric** (in 4.2, page 145)  
calculate, compareTo, getName, getValue, name, toString, value

## 8.17 Class **RatioLabelsetsUpToNExamples**

Class implementing the Ratio of number of labelsets up to N examples

### 8.17.1 Declaration

```
1 public class RatioLabelsetsUpToNExamples
2 extends mldc.base.MLDataMetric
```

---

### 8.17.2 All known subclasses

**RatioLabelsetsUpTo5Examples** (in 8.16, page 194), **RatioLabelsetsUpTo50Examples** (in 8.15, page 194), **RatioLabelsetsUpTo2Examples** (in 8.14, page 193), **RatioLabelsetsUpTo10Examples** (in 8.13, page 192)

### 8.17.3 Field summary

`n`

### 8.17.4 Constructor summary

`RatioLabelsetsUpToNExamples(int)` Constructor

### 8.17.5 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.17.6 Fields

- `protected int n`

### 8.17.7 Constructors

- **`RatioLabelsetsUpToNExamples`**

```
1 public RatioLabelsetsUpToNExamples(int n)
```

- **Description**

Constructor

- **Parameters**

\* `n` – Number of examples

### 8.17.8 Methods

- **`calculate`**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* `mlData` – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

### 8.17.9 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.18 Class `RatioLabelsetsWithExamplesLessThanHalfAttributes`

Class implementing the Ratio of labelsets with number of examples less than half of the attributes

### 8.18.1 Declaration

```
1 public class RatioLabelsetsWithExamplesLessThanHalfAttributes
2 extends mldc.base.MLDataMetric
```

---

### 8.18.2 Constructor summary

`RatioLabelsetsWithExamplesLessThanHalfAttributes()` Constructor

### 8.18.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.18.4 Constructors

- `RatioLabelsetsWithExamplesLessThanHalfAttributes`

```
1 public RatioLabelsetsWithExamplesLessThanHalfAttributes()
```

- **Description**  
Constructor

### 8.18.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 8.18.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value

## 8.19 Class `RatioUnconditionalDependentLabelPairsByChiSquare`

Class implementing the Ratio of unconditionally dependent label pairs by chi-square test

### 8.19.1 Declaration

```
1 public class RatioUnconditionalDependentLabelPairsByChiSquare
2 extends mldc.base.MLDataMetric
```

---

### 8.19.2 Constructor summary

`RatioUnconditionalDependentLabelPairsByChiSquare()` Constructor

### 8.19.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.19.4 Constructors

- `RatioUnconditionalDependentLabelPairsByChiSquare`

```
1 public RatioUnconditionalDependentLabelPairsByChiSquare()
```

- **Description**  
Constructor

### 8.19.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**  
Calculate metric value
- **Parameters**
  - \* `mlData` – Multi-label dataset to which calculate the metric
- **Returns** – Value of the metric

### 8.19.6 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.20 Class SCUMBLE

Class implementing the SCUMBLE

### 8.20.1 Declaration

```
1 public class SCUMBLE
2 extends mldc.base.MLDataMetric
```

---

### 8.20.2 Constructor summary

`SCUMBLE()` Constructor

### 8.20.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.20.4 Constructors

- **SCUMBLE**

```
1 public SCUMBLE()
```

- **Description**

Constructor

### 8.20.5 Methods

- **calculate**

```
1 public double calculate(MultiLabelInstances mlData)
```

- **Description**

Calculate metric value

- **Parameters**

\* `mlData` – Multi-label dataset to which calculate the metric

- **Returns** – Value of the metric

## 8.20.6 Members inherited from class MLDataMetric

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.21 Class StdvExamplesPerLabelset

Class implementing the Standard deviation of examples per labelset

### 8.21.1 Declaration

```
1 public class StdvExamplesPerLabelset
2 extends mldc.base.MLDataMetric
```

---

### 8.21.2 Constructor summary

`StdvExamplesPerLabelset()` Constructor

### 8.21.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.21.4 Constructors

- `StdvExamplesPerLabelset`

```
1 public StdvExamplesPerLabelset()
```

#### – Description

Constructor

### 8.21.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

#### – Description

Calculate metric value

#### – Parameters

\* `mlData` – Multi-label dataset to which calculate the metric

#### – Returns

Value of the metric

### 8.21.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

`calculate`, `compareTo`, `getName`, `getValue`, `name`, `toString`, `value`

## 8.22 Class `UniqueLabelsets`

Class implementing the Number of unique labelsets

### 8.22.1 Declaration

```
1 public class UniqueLabelsets
2 extends mldc.base.MLDataMetric
```

---

### 8.22.2 Constructor summary

`UniqueLabelsets()` Constructor

### 8.22.3 Method summary

`calculate(MultiLabelInstances)` Calculate metric value

### 8.22.4 Constructors

- `UniqueLabelsets`

```
1 public UniqueLabelsets()
```

#### – Description

Constructor

### 8.22.5 Methods

- `calculate`

```
1 public double calculate(MultiLabelInstances mlData)
```

#### – Description

Calculate metric value

#### – Parameters

\* `mlData` – Multi-label dataset to which calculate the metric

#### – Returns

Value of the metric

### 8.22.6 Members inherited from class `MLDataMetric`

`mldc.base.MLDataMetric` (in 4.2, page 145)

calculate, compareTo, getName, getValue, name, toString, value



## Chapter 9

# Package mldc.metricNames

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>AttributesMetrics</b> .....	203
Class storing the attribute metrics names	
<b>DimensionalityMetrics</b> .....	204
Class storing the dimensionality metrics names	
<b>ImbalanceMetrics</b> .....	205
Class storing the imbalance metrics names	
<b>LabelsDistributionMetrics</b> .....	206
Class storing the labels distribution metrics names	
<b>LabelsRelationMetrics</b> .....	206
Class storing the labels relation metrics names	

### 9.1 Class AttributesMetrics

Class storing the attribute metrics names

#### 9.1.1 Declaration

```
1 public class AttributesMetrics
2 extends java.lang.Object
```

---

#### 9.1.2 Constructor summary

AttributesMetrics()

#### 9.1.3 Method summary

getAvailableMetrics() Get the names of the available attributes metrics

### 9.1.4 Constructors

- **AttributesMetrics**

```
1 public AttributesMetrics()
```

### 9.1.5 Methods

- **getAvailableMetrics**

```
1 public static java.lang.String[] getAvailableMetrics()
```

- **Description**

Get the names of the available attributes metrics

- **Returns** – An array with the names

## 9.2 Class DimensionalityMetrics

Class storing the dimensionality metrics names

### 9.2.1 Declaration

```
1 public class DimensionalityMetrics
2 extends java.lang.Object
```

---

### 9.2.2 Constructor summary

**DimensionalityMetrics()**

### 9.2.3 Method summary

**getAvailableMetrics()** Get the names of the available dimensionality metrics

### 9.2.4 Constructors

- **DimensionalityMetrics**

```
1 public DimensionalityMetrics()
```

### 9.2.5 Methods

- **getAvailableMetrics**

```
1 public static java.lang.String[] getAvailableMetrics()
```

- **Description**

- Get the names of the available dimensionality metrics

- **Returns** – An array with the names

## 9.3 Class ImbalanceMetrics

Class storing the imbalance metrics names

### 9.3.1 Declaration

```
1 public class ImbalanceMetrics
2 extends java.lang.Object
```

---

### 9.3.2 Constructor summary

ImbalanceMetrics()

### 9.3.3 Method summary

getAvailableMetrics() Get the names of the available imbalance metrics

### 9.3.4 Constructors

- **ImbalanceMetrics**

```
1 public ImbalanceMetrics()
```

### 9.3.5 Methods

- **getAvailableMetrics**

```
1 public static java.lang.String[] getAvailableMetrics()
```

- **Description**

- Get the names of the available imbalance metrics

- **Returns** – An array with the names

## 9.4 Class LabelsDistributionMetrics

Class storing the labels distribution metrics names

### 9.4.1 Declaration

```
1 public class LabelsDistributionMetrics
2 extends java.lang.Object
```

---

### 9.4.2 Constructor summary

LabelsDistributionMetrics()

### 9.4.3 Method summary

getAvailableMetrics() Get the names of the available labels distribution metrics

### 9.4.4 Constructors

- LabelsDistributionMetrics

```
1 public LabelsDistributionMetrics()
```

### 9.4.5 Methods

- getAvailableMetrics

```
1 public static java.lang.String[] getAvailableMetrics()
```

- **Description**

Get the names of the available labels distribution metrics

- **Returns** – An array with the names

## 9.5 Class LabelsRelationMetrics

Class storing the labels relation metrics names

### 9.5.1 Declaration

```
1 public class LabelsRelationMetrics
2 extends java.lang.Object
```

---

### 9.5.2 Constructor summary

`LabelsRelationMetrics()`

### 9.5.3 Method summary

`getAvailableMetrics()` Get the names of the available labels relation metrics

### 9.5.4 Constructors

- `LabelsRelationMetrics`

```
1 public LabelsRelationMetrics()
```

### 9.5.5 Methods

- `getAvailableMetrics`

```
1 public static java.lang.String[] getAvailableMetrics()
```

- **Description**

Get the names of the available labels relation metrics

- **Returns** – An array with the names

# Chapter 10

## Package mldc.util

<i>Package Contents</i>	<i>Page</i>
<b>Classes</b>	
<b>ImbalancedFeature</b> .....	208
Class for imbalanced data, storing characteristics of an imbalanced attribute	
<b>Utils</b> .....	211
Class implementing different utils for metrics calculation	

### 10.1 Class ImbalancedFeature

Class for imbalanced data, storing characteristics of an imbalanced attribute

#### 10.1.1 Declaration

```
1 public class ImbalancedFeature
2 extends java.lang.Object
```

---

#### 10.1.2 Constructor summary

**ImbalancedFeature(String)** Constructor  
**ImbalancedFeature(String, double, double)** Constructor  
**ImbalancedFeature(String, int)** Constructor  
**ImbalancedFeature(String, int, double)** Constructor  
**ImbalancedFeature(String, int, double, double, double)** Constructor

#### 10.1.3 Method summary

**getAppearances()** Get number of appearances  
**getIRInterClass()** Get IR Inter-class  
**getIRIntraClass()** Get IR Intra-class  
**getName()** Get metric name  
**getVariance()** Get variance

### 10.1.4 Constructors

- **ImbalancedFeature**

```
1 public ImbalancedFeature(java.lang.String name)
```

- **Description**

- Constructor

- **Parameters**

- \* **name** – Name of the metric

- **ImbalancedFeature**

```
1 public ImbalancedFeature(java.lang.String name, double IRIntraClass, double variance)
```

- **Description**

- Constructor

- **Parameters**

- \* **name** – Name of the metric

- \* **IRIntraClass** – IR Intra-class value of the feature

- \* **variance** – Variance

- **ImbalancedFeature**

```
1 public ImbalancedFeature(java.lang.String name, int appearances)
```

- **Description**

- Constructor

- **Parameters**

- \* **name** – Name of the metric

- \* **appearances** – Number of appearances of the feature in the dataset

- **ImbalancedFeature**

```
1 public ImbalancedFeature(java.lang.String name, int appearances, double IRIntraClass)
```

- **Description**

- Constructor

- **Parameters**

- \* **name** – Name of the metric
- \* **appearances** – Number of appearances of the feature in the dataset
- \* **IRIntraClass** – IR Intra-class value

- **ImbalancedFeature**

```
1 public ImbalancedFeature(java.lang.String name,int appearances,double IRInterClass,  
    double IRIntraClass,double variance)
```

- **Description**

Constructor

- **Parameters**

- \* **name** – Name of the metric
- \* **appearances** – Number of appearances of the feature in the dataset
- \* **IRInterClass** – IR Inter-class value of the feature
- \* **IRIntraClass** – IR Intra-class value of the feature
- \* **variance** – Variance

### 10.1.5 Methods

- **getAppearances**

```
1 public int getAppearances()
```

- **Description**

Get number of appearances

- **Returns** – Number of appearances in the dataset

- **getIRInterClass**

```
1 public double getIRInterClass()
```

- **Description**

Get IR Inter-class

- **Returns** – IR Inter-class

- **getIRIntraClass**



```
1 public double getIRIntraClass()
```

- **Description**

Get IR Intra-class

- **Returns** – IR Intra-class

- **getName**

```
1 public java.lang.String getName()
```

- **Description**

Get metric name

- **Returns** – Name of the metric

- **getVariance**

```
1 public double getVariance()
```

- **Description**

Get variance

- **Returns** – Variance

## 10.2 Class Utils

Class implementing different utils for metrics calculation

### 10.2.1 Declaration

```
1 public class Utils
2 extends java.lang.Object
```

---

### 10.2.2 Constructor summary

Utils()

### 10.2.3 Method summary

**entropy(int[])** Entropy of array values  
**getAppearancesPerLabel(MultiLabelInstances)** Get array of ImbalancedFeature with labels frequency  
**getImbalancedWithIR(MultiLabelInstances, ImbalancedFeature[])** Calculate IRs of the ImbalancedFeatures  
**getLabelByName(String, ImbalancedFeature[])** Get an ImbalancedFeature with the label given by name  
**getMaxAppearance(ArrayList)** Get the max appearance in the list  
**getSortedByFrequency(ImbalancedFeature[])** Get array of ImbalancedFeature in desdendent order of frequency  
**labelsForInstance(MultiLabelInstances)** Get number of labels associated with each instance

### 10.2.4 Constructors

- **Utils**

```
1 public Utils()
```

### 10.2.5 Methods

- **entropy**

```
1 public static double entropy(int[] array)
```

- **Description**

- Entropy of array values

- **Parameters**

- \* **array** – Array with values to calculate entropy

- **Returns** – Entropy value

- **getAppearancesPerLabel**

```
1 public static ImbalancedFeature[] getAppearancesPerLabel(MultiLabelInstances dataset)
```

- **Description**

- Get array of ImbalancedFeature with labels frequency

- **Parameters**

- \* **dataset** – Multi-label dataset
- **Returns** – Array of ImbalancedFeature with the labels frequency

- **getImbalancedWithIR**

```
1 public static ImbalancedFeature[] getImbalancedWithIR(MultiLabelInstances dataset,
    ImbalancedFeature[] labels)
```

- **Description**  
Calculate IRs of the ImbalancedFeatures
- **Parameters**
  - \* **dataset** – Multi-label dataset
  - \* **labels** – Labels of the dataset as ImbalancedFeature objects
- **Returns** – Array of ImbalancedFeature objects with calculated IR

- **getLabelByName**

```
1 public static ImbalancedFeature getLabelByName(java.lang.String labelname,
    ImbalancedFeature[] list)
```

- **Description**  
Get an ImbalancedFeature with the label given by name
- **Parameters**
  - \* **labelname** – Name of the label
  - \* **list** – Array of ImbalancedFeature
- **Returns** – ImbalancedFeature according to the label name given

- **getMaxAppearance**

```
1 public static ImbalancedFeature getMaxAppearance(java.util.ArrayList list)
```

- **Description**  
Get the max appearance in the list
- **Parameters**
  - \* **list** – List of ImbalancedFeature
- **Returns** – Max value of appearance in the list

- **getSortedByFrequency**

```
1 public static ImbalancedFeature[] getSortedByFrequency(ImbalancedFeature[] labels)
```

- **Description**

Get array of ImbalancedFeature in descending order of frequency

- **Parameters**

- \* **labels** – Labels of the dataset as ImbalancedFeature objects

- **Returns** – Array of ImbalancedFeature in descending order of frequency

- **labelsForInstance**

```
1 public static int[] labelsForInstance(MultiLabelInstances mlData)
```

- **Description**

Get number of labels associated with each instance

- **Parameters**

- \* **mlData** – Multi-label dataset

- **Returns** – Array with the number of labels associated with each instance