

Index	Feature name	Description
1	cols	number of columns (variables)
2	rows	number of rows (constraints)
3	colsPerRow	columns per row (%)
4	equalities	number of equality constraints
5	nzEqualities	number of non-zeros in equality constraints
6	percEqualities	percentage of equality constraints
7	percNzEqualities	percentage of non-zero elements in inequality constraints
8	inequalities	number of inequality constraints
9	nzInequalities	number of non-zero elements in inequality constraints
10	nz	number of non-zero elements in the constraint matrix
11	density	density of the constraint matrix
12	bin	number of binary variables
13	genInt	total number of integer (excluding binaries)
14	integer	total number of integer (includes binaries) variables
15	continuous	number of continuous variables
16	percInteger	percentage of integer variables
17	percBin	percentage of binary variables
18	nUnbounded1	number of unbounded variables for one sense (positive or negative)
19	percUnbounded1	percentage of unbounded variables for one sense (positive or negative)
20	nUnbounded2	number of unbounded variables for both senses
21	percUnbounded2	percentage of unbounded variables for both senses
22	rPartitioning	number of partitioning constraints, e.g. $x_1 + x_2 + \dots = 1$ (binary vars)
23	rPercPartitioning	percentage of partitioning constraints
24	rPacking	number of packing constraints, e.g. $x_1 + x_2 + \dots \leq 1$ (binary vars)
25	rPercPacking	percentage of packing constraints
26	rPartPacking	number of partitioning or packing constraints
27	rPercRowsPartPacking	percentage of partitioning or packing constraints
28	rCovering	number of covering constraints, e.g. $x_1 + x_2 + \dots \geq 1$ (binary vars)
29	rPercCovering	percentage of covering constraints
30	rCardinality	number of cardinality constraints, e.g. $x_1 + x_2 + \dots = k$ , $k \geq 2$ (binary vars)
31	rPercCardinality	percentage of cardinality constraints

Index	Feature name	Description
32	rKnapsack	number of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $b$ integer $\geq 2$ (binary vars)
33	rPercKnapsack	percentage of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $b$ integer $\geq 2$ (binary vars)
34	rIntegerKnapsack	number of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer and $b \geq 2$ (binary vars)
35	rPercIntegerKnapsack	percentage of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer, $b \geq 2$ (binary vars)
36	rInvKnapsack	number of invariant knapsack constraints, e.g. $x_1 + x_2 + \dots \leq b$ , $b \geq 2$ (binary vars)
37	rPercInvKnapsack	percentage of invariant knapsack constraints
38	rSingleton	number of constraints with only one variable
39	rPercSingleton	percentage of constraints with only one variable
40	rAggre	number of constraints in the form $ax + by = c$
41	rPercAggre	percentage of constraints in the form $ax + by = c$
42	rPrec	number of constraints in the form $ax - ay \leq b$
43	rPercPrec	percentage of constraints in the form $ax - ay \leq b$
44	rVarBnd	number of constraints with only one variable
45	rPercVarBnd	percentage of constraints with only one variable
46	rBinPacking	number of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer, $b \geq 2$ , at least one $c_j \geq 2$ (binary vars)
47	rPercBinPacking	percentage of knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer, $b \geq 2$ , at least one $c_j \geq 2$ (binary vars)
48	rMixedBin	constraint that involves binary and continuous variables
49	rPercMixedBin	percentage of constraints that involves binary and continuous variables
50	rGenInt	number of constraints with some general integer (not binary) variables
51	rPercGenInt	percentage of constraints with some general integer (not binary) variables
52	rFlowBin	number of equality constraints with at least 2 positive and 2 negative coefficients, and only binary variables
53	rPercFlowBin	percentage of equality constraints with at least 2 positive and 2 negative coefficients, and only binary variables
54	rFlowMx	number of equality constraints with at least 2 positive and 2 negative coefficients

Index	Feature name	Description
55	rPercFlowMx	percentage of equality constraints with at least 2 positive and 2 negative coefficients
56	rNzRowsPartitioning	number of non-zeros in partitioning constraint, e.g. $x_1 + x_2 + \dots = 1$ (binary vars)
57	rNzPercRowsPartitioning	percentage of non-zeros in partitioning constraint, e.g. $x_1 + x_2 + \dots = 1$ (binary vars)
58	rNzRowsPacking	number of non-zeros in packing constraint, e.g. $x_1 + x_2 + \dots \leq 1$ (binary vars)
59	rNzPercRowsPacking	percentage of non-zeros in packing constraint, e.g. $x_1 + x_2 + \dots \leq 1$ (binary vars)
60	rNzrowsPartPacking	number of non-zeros in partitioning or packing constraint
61	rNzpercRowsPartPacking	percentage of non-zeros in partitioning or packing constraint
62	rNzRowsCovering	number of non-zeros in covering constraint, e.g. $x_1 + x_2 + \dots \geq 1$ (binary vars)
63	rNzPercRowsCovering	percentage of non-zeros in covering constraint, e.g. $x_1 + x_2 + \dots \geq 1$ (binary vars)
64	rNzRowsCardinality	number of non-zeros in cardinality constraints, e.g. $x_1 + x_2 + \dots = k, k \geq 2$ (binary vars)
65	rNzPercRowsCardinality	percentage of non-zeros in cardinality constraints, e.g. $x_1 + x_2 + \dots = k, k \geq 2$ (binary vars)
66	rNzRowsKnapsack	number of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b, b \text{ integer} \geq 2$ (binary vars)
67	rNzPercRowsKnapsack	percentage of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b, b \text{ integer} \geq 2$ (binary vars)
68	rNzRowsIntegerKnapsack	number of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b, c_j \text{ and } b \text{ integer}, b \geq 2$ (binary vars)
69	rNzPercRowsIntegerKnapsack	percentage of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b, c_j \text{ and } b \text{ integer}, b \geq 2$ (binary vars)
70	rNzRowsInvKnapsack	number of non-zeros in invariant knapsack constraints, e.g. $x_1 + x_2 + \dots \leq b, b \geq 2$ (binary vars)
71	rNzPercRowsInvKnapsack	percentage of number of non-zeros in invariant knapsack constraints, e.g. $x_1 + x_2 + \dots \leq b, b \geq 2$ (binary vars)
72	rNzRowsSingleton	number of non-zeros in constraints with only one variable
73	rNzPercRowsSingleton	percentage of non-zeros in constraints with only one variable
74	rNzRowsAggr	number of non-zeros in constraints in the form $ax + by = c$
75	rNzPercRowsAggr	percentage of non-zeros in constraints in the form $ax + by = c$
76	rNzRowsPrec	number of non-zeros in constraints in the form $ax - ay \leq b$
77	rNzPercRowsPrec	percentage of non-zeros in constraints in the form $ax - ay \leq b$
78	rNzRowsVarBnd	number of non-zeros in constraints with only one binary variable

Index	Feature name	Description
79	rNzPercRowsVarBnd	percentage of non-zeros in constraints with only one binary variable
80	rNzRowsBinPacking	number of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer, $b \geq 2$ , at least one $c_j \geq 2$ (binary vars)
81	rNzPercRowsBinPacking	percentage of non-zeros in knapsack constraints, e.g. $c_1 * x_1 + c_2 * x_2 + \dots \leq b$ , $c_j$ and $b$ integer, $b \geq 2$ , at least one $c_j \geq 2$ (binary vars)
82	rNzRowsMixedBin	number of non-zeros in constraint that involves binary and continuous variables
83	rNzPercRowsMixedBin	percentage of non-zeros in constraint that involves binary and continuous variables
84	rNzRowsGenInt	number of non-zeros in constraints with some general integer (not binary) variables
85	rNzPercRowsGenInt	percentage of non-zeros in constraints with some general integer (not binary) variables
86	rNzRowsFlowBin	number of non-zeros in equality constraints with at least 2 positive and 2 negative coefficients, and only binary variables
87	rNzPercRowsFlowBin	percentage of non-zeros in equality constraints with at least 2 positive and 2 negative coefficients, and only binary variables
88	rNzRowsFlowMx	number of non-zeros in equality constraints with at least 2 positive and 2 negative coefficients
89	rNzPercRowsFlowMx	percentage of non-zeros in equality constraints with at least 2 positive and 2 negative coefficients
90	aMin	the smallest coefficient of the constraint matrix
91	aMax	the largest coefficient of the constraint matrix
92	aAvg	the average of the constraint matrix coefficients
93	aStdDev	the standard deviation of the coefficients in the constraint matrix
94	aRatioLSA	aMax per aMin
95	aAllInt	1 if all variables have an integer coefficient in the constraint matrix or 0, otherwise
96	aPercInt	percentage of variables with integer coefficient in the constraint matrix
97	aDiffVal	number of different coefficients in the constraint matrix
98	anShortInts	number of small coefficients in the constraint matrix
99	apercShortInts	percentage of small coefficients in the constraint matrix
100	objMin	the smallest coefficient in the objective function
101	objMax	the largest coefficient in the objective function
102	objAvg	the average of the objective function coefficients
103	objStdDev	the standard deviation of the coefficients in the objective function
104	objRatioLSA	objMax per objMin

Index	Feature name	Description
105	objAllInt	1 if all variables have an integer coefficient in the objective function or 0, otherwise
106	objPercInt	percentage of variables with integer coefficient in the objective function
107	objDiffVal	number of different coefficients in the objective function
108	objnShortInts	number of small coefficients in the objective function
109	objpercShortInts	percentage of small coefficients in the objective function
110	rhsMin	the smallest coefficient on the right-hand-side of the constraints
111	rhsMax	the largest coefficient on the right-hand-side of the constraints
112	rhsAvg	the average of the coefficients on the right-hand-side of the constraints
113	rhsStdDev	the standard deviation of the coefficients on the right-hand-side of the constraints
114	rhsRatioLSA	rhsMax per rhsMin
115	rhsAllInt	1 if all coefficients on the right-hand-side of the constraints are integers or 0, otherwise
116	rhsPercInt	percentage of integer coefficients on the right-hand-side of the constraints
117	rhsDiffVal	number of different coefficients on the right-hand-side of the constraints
118	rhsnShortInts	number of small coefficients on the right-hand-side of the constraints
119	rhspercShortInts	percentage of small coefficients on the right-hand-side of the constraints
120	rowNzMin	the smallest amount of non-zeros in the constraints
121	rowNzMax	the largest amount of non-zeros in the constraints
122	rowNzAvg	the average of non-zeros in the constraints
123	rowNzStdDev	the standard deviation of non-zeros in the constraints
124	colNzMin	the smallest number of non-zeros in the coefficient of the variables
125	colNzMax	the largest number of non-zeros in the coefficient of the variables
126	colNzAvg	the average of non-zeros in the coefficient of the variables
127	colNzStdDev	the standard deviation of non-zeros in the coefficient of the variables
128	rowsLess4Nz	constraints with number of non-zero coefficients less than or equal to 4
129	rowsLess8Nz	constraints with number of non-zero coefficients less than or equal to 8
130	rowsLess16Nz	constraints with number of non-zero coefficients less than or equal to 16
131	rowsLess32Nz	constraints with number of non-zero coefficients less than or equal to 32
132	rowsLess64Nz	constraints with number of non-zero coefficients less than or equal to 64
133	rowsLess128Nz	constraints with number of non-zero coefficients less than or equal to 128
134	rowsLess256Nz	constraints with number of non-zero coefficients less than or equal to 256
135	rowsLess512Nz	constraints with number of non-zero coefficients less than or equal to 512
136	rowsLess1024Nz	constraints with number of non-zero coefficients less than or equal to 1024

Index	Feature name	Description
137	percRowsLess4Nz	percentage of constraints with number of non-zero coefficients less than or equal to 4
138	percRowsLess8Nz	percentage of constraints with number of non-zero coefficients less than or equal to 8
139	percRowsLess16Nz	percentage of constraints with number of non-zero coefficients less than or equal to 16
140	percRowsLess32Nz	percentage of constraints with number of non-zero coefficients less than or equal to 32
141	percRowsLess64Nz	percentage of constraints with number of non-zero coefficients less than or equal to 64
142	percRowsLess128Nz	percentage of constraints with number of non-zero coefficients less than or equal to 128
143	percRowsLess256Nz	percentage of constraints with number of non-zero coefficients less than or equal to 256
144	percRowsLess512Nz	percentage of constraints with number of non-zero coefficients less than or equal to 512
145	percRowsLess1024Nz	percentage of constraints with number of non-zero coefficients less than or equal to 1024
146	rowsLeast4Nz	number of constraints with at least 4 non-zero coefficients
147	rowsLeast8Nz	number of constraints with at least 8 non-zero coefficients
148	rowsLeast16Nz	number of constraints with at least 16 non-zero coefficients
149	rowsLeast32Nz	number of constraints with at least 32 non-zero coefficients
150	rowsLeast64Nz	number of constraints with at least 64 non-zero coefficients
151	rowsLeast128Nz	number of constraints with at least 128 non-zero coefficients
152	rowsLeast256Nz	number of constraints with at least 256 non-zero coefficients
153	rowsLeast512Nz	number of constraints with at least 512 non-zero coefficients
154	rowsLeast1024Nz	number of constraints with at least 1024 non-zero coefficients
155	rowsLeast2048Nz	number of constraints with at least 2048 non-zero coefficients
156	rowsLeast4096Nz	number of constraints with at least 4096 non-zero coefficients
157	percRowsLeast4Nz	percentage of constraints with at least 4 non-zero coefficients
158	percRowsLeast8Nz	percentage of constraints with at least 8 non-zero coefficients
159	percRowsLeast16Nz	percentage of constraints with at least 16 non-zero coefficients
160	percRowsLeast32Nz	percentage of constraints with at least 32 non-zero coefficients
161	percRowsLeast64Nz	percentage of constraints with at least 64 non-zero coefficients
162	percRowsLeast128Nz	percentage of constraints with at least 128 non-zero coefficients
163	percRowsLeast256Nz	percentage of constraints with at least 256 non-zero coefficients
164	percRowsLeast512Nz	percentage of constraints with at least 512 non-zero coefficients
165	percRowsLeast1024Nz	percentage of constraints with at least 1024 non-zero coefficients
166	percRowsLeast2048Nz	percentage of constraints with at least 2048 non-zero coefficients
167	percRowsLeast4096Nz	percentage of constraints with at least 4096 non-zero coefficients
168	colsLess4Nz	columns with number of non-zero coefficients less than or equal to 4

Index	Feature name	Description
169	colsLess8Nz	columns with number of non-zero coefficients less than or equal to 8
170	colsLess16Nz	columns with number of non-zero coefficients less than or equal to 16
171	colsLess32Nz	columns with number of non-zero coefficients less than or equal to 32
172	colsLess64Nz	columns with number of non-zero coefficients less than or equal to 64
173	colsLess128Nz	columns with number of non-zero coefficients less than or equal to 128
174	colsLess256Nz	columns with number of non-zero coefficients less than or equal to 256
175	colsLess512Nz	columns with number of non-zero coefficients less than or equal to 512
176	colsLess1024Nz	columns with number of non-zero coefficients less than or equal to 1024
177	percColsLess4Nz	percentage of columns with number of non-zero coefficients less than or equal to 4
178	percColsLess8Nz	percentage of columns with number of non-zero coefficients less than or equal to 8
179	percColsLess16Nz	percentage of columns with number of non-zero coefficients less than or equal to 16
180	percColsLess32Nz	percentage of columns with number of non-zero coefficients less than or equal to 32
181	percColsLess64Nz	percentage of columns with number of non-zero coefficients less than or equal to 64
182	percColsLess128Nz	percentage of columns with number of non-zero coefficients less than or equal to 128
183	percColsLess256Nz	percentage of columns with number of non-zero coefficients less than or equal to 256
184	percColsLess512Nz	percentage of columns with number of non-zero coefficients less than or equal to 512
185	percColsLess1024Nz	percentage of columns with number of non-zero coefficients less than or equal to 1024
186	colsLeast4Nz	number of columns with at least 4 non-zero coefficients
187	colsLeast8Nz	number of columns with at least 8 non-zero coefficients
188	colsLeast16Nz	number of columns with at least 16 non-zero coefficients
189	colsLeast32Nz	number of columns with at least 32 non-zero coefficients
190	colsLeast64Nz	number of columns with at least 64 non-zero coefficients
191	colsLeast128Nz	number of columns with at least 128 non-zero coefficients
192	colsLeast256Nz	number of columns with at least 256 non-zero coefficients
193	colsLeast512Nz	number of columns with at least 512 non-zero coefficients
194	colsLeast1024Nz	number of columns with at least 1024 non-zero coefficients
195	colsLeast2048Nz	number of columns with at least 2048 non-zero coefficients
196	colsLeast4096Nz	number of columns with at least 4096 non-zero coefficients
197	percColsLeast4Nz	percentage of columns with at least 4 non-zero coefficients
198	percColsLeast8Nz	percentage of columns with at least 8 non-zero coefficients
199	perccolsLeast16Nz	percentage of columns with at least 16 non-zero coefficients
200	perccolsLeast32Nz	percentage of columns with at least 32 non-zero coefficients

Index	Feature name	Description
201	perccolsLeast64Nz	percentage of columns with at least 64 non-zero coefficients
202	perccolsLeast128Nz	percentage of columns with at least 128 non-zero coefficients
203	perccolsLeast256Nz	percentage of columns with at least 256 non-zero coefficients
204	perccolsLeast512Nz	percentage of columns with at least 512 non-zero coefficients
205	perccolsLeast1024Nz	percentage of columns with at least 1024 non-zero coefficients
206	perccolsLeast2048Nz	percentage of columns with at least 2048 non-zero coefficients
207	perccolsLeast4096Nz	percentage of columns with at least 4096 non-zero coefficients

Table 1: Description of features available in Python-Mip.