

MACCSKeysFingerprints.pl - Generate MACCS key fingerprints for SD files

## SYNOPSIS

MACCSKeysFingerprints.pl SDFFile(s)...

```
MACCSKeysFingerprints.pl [--AromaticityModel AromaticityModelType] [--BitsOrder Ascending | Descending] [-b,
--BitStringFormat BinaryString | HexadecimalString] [--CompoundID DataFieldName or LabelPrefixString] [--CompoundIDLabel
text] [--CompoundIDMode DataField | MolName | LabelPrefix | MolNameOrLabelPrefix] [--DataFields "FieldLabel1,FieldLabel2,..." ]
[-d, --DataFieldsMode All | Common | Specify | CompoundID] [-f, --Filter Yes | No] [--FingerprintsLabel text] [-h, --help] [-k,
--KeepLargestComponent Yes | No] [-m, --mode MACCSKeyBits | MACCSKeyCount] [--OutDelim comma | tab | semicolon] [
--output SD | FP | text | all] [-o, --overwrite] [-q, --quote Yes | No] [-r, --root RootName] [-s, --size number] [-v,
--VectorStringFormat IDsAndValuesString | IDsAndValuesPairsString | ValuesAndIDsString | ValuesAndIDsPairsString] [-w,
--WorkingDir DirName]
```

## DESCRIPTION

Generate MACCS (Molecular ACCEss System) keys fingerprints [ Ref 45-47 ] for *SDF*file(s) and create appropriate SD, FP or CSV/TSV text file(s) containing fingerprints bit-vector or vector strings corresponding to molecular fingerprints.

Multiple SDF file names are separated by spaces. The valid file extensions are *.sdf* and *.sd*. All other file names are ignored. All the SD files in a current directory can be specified either by *\*.sdf* or the current directory name.

For each MACCS keys definition, atoms are processed to determine their membership to the key and the appropriate molecular fingerprints strings are generated. An atom can belong to multiple MACCS keys.

For *MACCSKeyBits* value of -m, --mode option, a fingerprint bit-vector string containing zeros and ones is generated and for *MACCSKeyCount* value, a fingerprint vector string corresponding to number of MACCS keys [ Ref 45-47 ] is generated.

*MACCSKeyBits* / *MACCSKeyCount* values for -m, --mode option along with two possible 166 / 322 values of -s, --size supports generation of four different types of MACCS keys fingerprint: *MACCS166KeyBits*, *MACCS166KeyCount*, *MACCS322KeyBits*, *MACCS322KeyCount*.

Example of **SD** file containing MAACS keys fingerprints string data:

[illegible]

Example of *FP* file containing MAACS keys fingerprints string data:

[illegible]

```
"CompoundID","MACCSKeysFingerprints"  
{"Cmpd1","FingerprintsBitVector;MACCSKeyBits;166;BinaryString;Ascending;  
0000000000000000000000000000000000000000000000000000000000000000  
001110001001010101111000110110001001101100000110111101001101111111  
011111111111111111110111000"  
... ..  
... ..
```

```
FingerprintsBitVector;MACCSKeyBits;166;BinaryString;Ascending;00000000  
000000000000000000000000000000001001000010010000000010010000000011100  
01001010101111000110110001001101100000110111101001101111111111011111  
1111111111110111000
```

[illegible]

```
FingerprintsVector;MACCSKeyCount;166;OrderedNumericalValues;ValuesStr  
ing;0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
0 0 0 0 0 0 0 0 1 0 0 3 0 0 0 0 4 0 0 2 0 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0  
0 0 0 0 0 1 1 8 0 0 0 1 0 0 1 0 1 0 1 3 1 3 1 0 0 0 1 2 0 11 1 0 0 0  
5 0 0 1 2 0 1 1 0 0 0 0 0 1 1 0 1 1 1 0 4 0 0 1 1 0 4 6 1 1 1 2 1 1  
3 5 2 2 0 5 3 5 1 1 2 5 1 2 1 2 4 8 3 5 5 2 2 0 3 5 4 1
```

[illegible]

--CompoundI D *DataFieldName* or *LabelPrefixString*

```
FingerprintsBitVector;MACCSKeyBits;32;HexString;Ascending;7d7e7af3edc000c1100000000000005000000000000000000000003000000000000000
```

For **DataField** value of --CompoundIDMode option, it corresponds to datafield label name whose value is used as compound ID; otherwise, it's a prefix string used for generating compound IDs like LabelPrefixString<Number>. Default value, **Cmpd**, generates compound IDs which look like Cmpd<Number>.

MolID  
ExtReq

Compound

The value specified above generates compound IDs which correspond to Compound<Number> instead of default value of Cmpd<Number>.

Specify compound ID column label for FP or CSV/TSV text file(s) used during *CompoundID* value of --DataFieldsMode option. Default: *CompoundID*.

Specify how to generate compound IDs and write to FP or CSV/TSV text file(s) along with generated fingerprints for *FP | text | all* values of --output option: use a *SDFFile(s)* datafield value; use molname line from *SDFFile(s)*; generate a sequential ID with specific prefix; use combination of both MolName and LabelPrefix with usage of LabelPrefix values for empty molname lines.

For *MolNameAndLabelPrefix* value of --CompoundIDMode, molname line in *SDFFile(s)* takes precedence over sequential compound IDs generated using *LabelPrefix* and only empty molname values are replaced with sequential compound IDs.

This is only used for *CompoundID* value of --DataFieldsMode option.

Comma delimited list of *SDF*file(s) data fields to extract and write to CSV/TSV text file(s) along with generated fingerprints for *text* / *all* values of --output option.

This is only used for *Specify* value of --DataFieldsMode option.

Examples:

```
Extreg
MolID,CompoundName
```

`-d, --DataFieldsMode All | Common | Specify | CompoundID`

Specify how data fields in *SDF*file(s) are transferred to output CSV/TSV text file(s) along with generated fingerprints for *text* | all values of --output option: transfer all SD data field; transfer SD data files common to all compounds; extract specified data fields; generate a compound ID using molname line, a compound prefix, or a combination of both.

Possible values: *All* / *Common* / *specify* / *CompoundID*. Default value: *CompoundID*.

-f, --Filter Yes / No

Specify whether to check and filter compound data in SDFFile(s). Possible values: **Yes or No**. Default value: **Yes**.

By default, compound data is checked before calculating fingerprints and compounds containing atom data corresponding to non-element symbols or no atom data are ignored.

```
--FingerprintsLabel text
```

SD data label or text file column label to use for fingerprints string in output SD or CSV/TSV text file(s) specified by

--output. Default value: *MACCSKeyFingerprints*.

-h, --help

Print this help message.

-k, --KeepLargestComponent *Yes / No*

Generate fingerprints for only the largest component in molecule. Possible values: *Yes or No*. Default value: *Yes*.

For molecules containing multiple connected components, fingerprints can be generated in two different ways: use all connected components or just the largest connected component. By default, all atoms except for the largest connected component are deleted before generation of fingerprints.

-m, --mode *MACCSKeyBits / MACCSKeyCount*

Specify type of MACCS keys [ Ref 45-47 ] fingerprints to generate for molecules in *SDFFile(s)*. Possible values: *MACCSKeyBits, MACCSKeyCount*. Default value: *MACCSKeyBits*.

For *MACCSKeyBits* value of -m, --mode option, a fingerprint bit-vector string containing zeros and ones is generated and for *MACCSKeyCount* value, a fingerprint vector string corresponding to number of MACCS keys is generated.

*MACCSKeyBits / MACCSKeyCount* values for -m, --mode option along with two possible *166 / 322* values of -s, --size supports generation of four different types of MACCS keys fingerprint: *MACCS166KeyBits, MACCS166KeyCount, MACCS322KeyBits, MACCS322KeyCount*.

Definition of MACCS keys uses the following atom and bond symbols to define atom and bond environments:

Atom symbols for 166 keys [ Ref 47 ]:

A : Any valid periodic table element symbol  
Q : Hetro atoms; any non-C or non-H atom  
X : Halogens; F, Cl, Br, I  
Z : Others; other than H, C, N, O, Si, P, S, F, Cl, Br, I

Atom symbols for 322 keys [ Ref 46 ]:

A : Any valid periodic table element symbol  
Q : Hetro atoms; any non-C or non-H atom  
X : Others; other than H, C, N, O, Si, P, S, F, Cl, Br, I  
Z is neither defined nor used

Bond types:

- : Single  
= : Double  
T : Triple  
# : Triple  
~ : Single or double query bond  
% : An aromatic query bond

None : Any bond type; no explicit bond specified

\$ : Ring bond; \$ before a bond type specifies ring bond  
! : Chain or non-ring bond; ! before a bond type specifies chain bond

@ : A ring linkage and the number following it specifies the atoms position in the line, thus @1 means linked back to the first atom in the list.

Aromatic: Kekule or Arom5

Kekule: Bonds in 6-membered rings with alternate single/double bonds or perimeter bonds

Arom5: Bonds in 5-membered rings with two double bonds and a hetro atom at the apex of the ring.

MACCS 166 keys [ Ref 45-47 ] are defined as follows:

Key Description

- 1 ISOTOPE
- 2 103 < ATOMIC NO. < 256
- 3 GROUP IVA,VA,VIA PERIODS 4-6 (Ge...)
- 4 ACTINIDE
- 5 GROUP IIIB,IVB (Sc...)
- 6 LANTHANIDE
- 7 GROUP VB,VIB,VIIB (V...)
- 8 QAAA@1
- 9 GROUP VIII (Fe...)
- 10 GROUP IIA (ALKALINE EARTH)
- 11 4M RING
- 12 GROUP IB,IIIB (Cu...)
- 13 ON(C)C

14 S-S  
15 OC(O)O  
16 QAA@1  
17 CTC  
18 GROUP IIIA (B...)  
19 7M RING  
20 SI  
21 C=C(Q)Q  
22 3M RING  
23 NC(O)O  
24 N-O  
25 NC(N)N  
26 C\$=C(\$A)\$A  
27 I  
28 QCH2Q  
29 P  
30 CQ(C)(C)A  
31 QX  
32 CSN  
33 NS  
34 CH2=A  
35 GROUP IA (ALKALI METAL)  
36 S HETEROCYCLE  
37 NC(O)N  
38 NC(C)N  
39 OS(O)O  
40 S-O  
41 CTN  
42 F  
43 QHAQH  
44 OTHER  
45 C=CN  
46 BR  
47 SAN  
48 OQ(O)O  
49 CHARGE  
50 C=C(C)C  
51 CSO  
52 NN  
53 QHAAQH  
54 QHAAQH  
55 OSO  
56 ON(O)C  
57 O HETEROCYCLE  
58 QSQ  
59 Snot%A%A  
60 S=O  
61 AS(A)A  
62 A\$A!A\$A  
63 N=O  
64 A\$A!S  
65 C%N  
66 CC(C)(C)A  
67 QS  
68 QHQH (&...)  
69 QQH  
70 QNQ  
71 NO  
72 OAAO  
73 S=A  
74 CH3ACH3  
75 A!N\$A  
76 C=C(A)A  
77 NAN  
78 C=N  
79 NAAN  
80 NAAAN  
81 SA(A)A  
82 ACH2QH  
83 QAAAA@1  
84 NH2  
85 CN(C)C  
86 CH2QCH2  
87 X!A\$A  
88 S  
89 OAAAO  
90 QHAACH2A  
91 QHAAACH2A

92 OC(N)C  
93 QCH3  
94 QN  
95 NAAO  
96 5M RING  
97 NAAAO  
98 QAAAAA@1  
99 C=C  
100 ACH2N  
101 8M RING  
102 QO  
103 CL  
104 QHACH2A  
105 A\$A(\$A)\$A  
106 QA(Q)Q  
107 XA(A)A  
108 CH3AAACH2A  
109 ACH2O  
110 NCO  
111 NACH2A  
112 AA(A)(A)A  
113 Onot%A%A  
114 CH3CH2A  
115 CH3ACH2A  
116 CH3AACH2A  
117 NAO  
118 ACH2CH2A > 1  
119 N=A  
120 HETEROCYCLIC ATOM > 1 (&...)  
121 N HETEROCYCLE  
122 AN(A)A  
123 OCO  
124 QQ  
125 AROMATIC RING > 1  
126 A!O!A  
127 A\$A!O > 1 (&...)  
128 ACH2AAACH2A  
129 ACH2AACH2A  
130 QQ > 1 (&...)  
131 QH > 1  
132 OACH2A  
133 A\$A!N  
134 X (HALOGEN)  
135 Nnot%A%A  
136 O=A > 1  
137 HETEROCYCLE  
138 QCH2A > 1 (&...)  
139 OH  
140 O > 3 (&...)  
141 CH3 > 2 (&...)  
142 N > 1  
143 A\$A!O  
144 Anot%A%Anot%A  
145 6M RING > 1  
146 O > 2  
147 ACH2CH2A  
148 AQ(A)A  
149 CH3 > 1  
150 A!A\$A!A  
151 NH  
152 OC(C)C  
153 QCH2A  
154 C=O  
155 A!CH2!A  
156 NA(A)A  
157 C-O  
158 C-N  
159 O > 1  
160 CH3  
161 N  
162 AROMATIC  
163 6M RING  
164 O  
165 RING  
166 FRAGMENTS

MACCS 322 keys set as defined in tables 1, 2 and 3 [ Ref 46 ] include:

- . 26 atom properties of type P, as listed in Table 1
- . 32 one-atom environments, as listed in Table 3
- . 264 atom-bond-atom combinations listed in Table 4

Total number of keys in three tables is : 322

Atom symbol, X, used for 322 keys [ Ref 46 ] doesn't refer to Halogens as it does for 166 keys. In order to keep the definition of 322 keys consistent with the published definitions, the symbol X is used to imply "others" atoms, but it's internally mapped to symbol X as defined for 166 keys during the generation of key values.

Atom properties-based keys (26):

Key	Description
1	A(AAA) or AA(A)A - atom with at least three neighbors
2	Q - heteroatom
3	Anot%not-A - atom involved in one or more multiple bonds, not aromatic
4	A(AAAA) or AA(A)(A)A - atom with at least four neighbors
5	A(QQ) or QA(Q) - atom with at least two heteroatom neighbors
6	A(QQQ) or QA(Q)Q - atom with at least three heteroatom neighbors
7	QH - heteroatom with at least one hydrogen attached
8	CH2(AA) or ACH2A - carbon with at least two single bonds and at least two hydrogens attached
9	CH3(A) or ACH3 - carbon with at least one single bond and at least three hydrogens attached
10	Halogen
11	A(-A-A-A) or A-A(-A)-A - atom has at least three single bonds
12	AAAAA@l > 2 - atom is in at least two different six-membered rings
13	A(\$A\$A\$A) or A\$A(\$A)\$A - atom has more than two ring bonds
14	A\$A!A\$A - atom is at a ring/chain boundary. When a comparison is done with another atom the path passes through the chain bond.
15	Anot%A%Anot%A - atom is at an aromatic/nonaromatic boundary. When a comparison is done with another atom the path passes through the aromatic bond.
16	A!A!A - atom with more than one chain bond
17	A!A\$A!A - atom is at a ring/chain boundary. When a comparison is done with another atom the path passes through the ring bond.
18	A%Anot%A%A - atom is at an aromatic/nonaromatic boundary. When a comparison is done with another atom the path passes through the nonaromatic bond.
19	HETEROCYCLE - atom is a heteroatom in a ring.
20	rare properties: atom with five or more neighbors, atom in four or more rings, or atom types other than H, C, N, O, S, F, Cl, Br, or I
21	rare properties: atom has a charge, is an isotope, has two or more multiple bonds, or has a triple bond.
22	N - nitrogen
23	S - sulfur
24	O - oxygen
25	A(AA)A(A)A(AA) - atom has two neighbors, each with three or more neighbors (including the central atom).
26	CHACH2 - atom has two hydrocarbon (CH2) neighbors

Atomic environments properties-based keys (32):

Key	Description
27	C(CC)
28	C(CCC)
29	C(CN)
30	C(CCN)
31	C(NN)
32	C(NNC)
33	C(NNN)
34	C(CO)
35	C(CCO)
36	C(NO)
37	C(NCO)
38	C(NNO)
39	C(OO)
40	C(COO)
41	C(NOO)
42	C(OOO)
43	Q(CC)
44	Q(CCC)
45	Q(CN)
46	Q(CCN)
47	Q(NN)
48	Q(CNN)
49	Q(NNN)
50	Q(CO)
51	Q(CCO)

52	Q(NO)
53	Q(CNO)
54	Q(NNO)
55	Q(OO)
56	Q(COO)
57	Q(NOO)
58	Q(OOO)

Note: The first symbol is the central atom, with atoms bonded to the central atom listed in parentheses. Q is any non-C, non-H atom. If only two atoms are in parentheses, there is no implication concerning the other atoms bonded to the central atom.

Atom-Bond-Atom properties-based keys: (264)

Key	Description
59	C-C
60	C-N
61	C-O
62	C-S
63	C-Cl
64	C-P
65	C-F
66	C-Br
67	C-Si
68	C-I
69	C-X
70	N-N
71	N-O
72	N-S
73	N-Cl
74	N-P
75	N-F
76	N-Br
77	N-Si
78	N-I
79	N-X
80	O-O
81	O-S
82	O-Cl
83	O-P
84	O-F
85	O-Br
86	O-Si
87	O-I
88	O-X
89	S-S
90	S-Cl
91	S-P
92	S-F
93	S-Br
94	S-Si
95	S-I
96	S-X
97	Cl-Cl
98	Cl-P
99	Cl-F
100	Cl-Br
101	Cl-Si
102	Cl-I
103	Cl-X
104	P-P
105	P-F
106	P-Br
107	P-Si
108	P-I
109	P-X
110	F-F
111	F-Br
112	F-Si
113	F-I
114	F-X
115	Br-Br
116	Br-Si
117	Br-I
118	Br-X
119	Si-Si
120	Si-I
121	Si-X
122	I-I



123	I-X
124	X-X
125	C=C
126	C=N
127	C=O
128	C=S
129	C=Cl
130	C=P
131	C=F
132	C=Br
133	C=Si
134	C=I
135	C=X
136	N=N
137	N=O
138	N=S
139	N=Cl
140	N=P
141	N=F
142	N=Br
143	N=Si
144	N=I
145	N=X
146	O=O
147	O=S
148	O=Cl
149	O=P
150	O=F
151	O=Br
152	O=Si
153	O=I
154	O=X
155	S=S
156	S=Cl
157	S=P
158	S=F
159	S=Br
160	S=Si
161	S=I
162	S=X
163	Cl=Cl
164	Cl=P
165	Cl=F
166	Cl=Br
167	Cl=Si
168	Cl=I
169	Cl=X
170	P=P
171	P=F
172	P=Br
173	P=Si
174	P=I
175	P=X
176	F=F
177	F=Br
178	F=Si
179	F=I
180	F=X
181	Br=Br
182	Br=Si
183	Br=I
184	Br=X
185	Si=Si
186	Si=I
187	Si=X
188	I=I
189	I=X
190	X=X
191	C#C
192	C#N
193	C#O
194	C#S
195	C#Cl
196	C#P
197	C#F
198	C#Br
199	C#Si
200	C#I

201	C#X
202	N#N
203	N#O
204	N#S
205	N#Cl
206	N#P
207	N#F
208	N#Br
209	N#Si
210	N#I
211	N#X
212	O#O
213	O#S
214	O#Cl
215	O#P
216	O#F
217	O#Br
218	O#Si
219	O#I
220	O#X
221	S#S
222	S#Cl
223	S#P
224	S#F
225	S#Br
226	S#Si
227	S#I
228	S#X
229	Cl#Cl
230	Cl#P
231	Cl#F
232	Cl#Br
233	Cl#Si
234	Cl#I
235	Cl#X
236	P#P
237	P#F
238	P#Br
239	P#Si
240	P#I
241	P#X
242	F#F
243	F#Br
244	F#Si
245	F#I
246	F#X
247	Br#Br
248	Br#Si
249	Br#I
250	Br#X
251	Si#Si
252	Si#I
253	Si#X
254	I#I
255	I#X
256	X#X
257	C\$C
258	C\$N
259	C\$O
260	C\$S
261	C\$Cl
262	C\$P
263	C\$F
264	C\$Br
265	C\$Si
266	C\$I
267	C\$X
268	N\$N
269	N\$O
270	N\$S
271	N\$Cl
272	N\$P
273	N\$F
274	N\$Br
275	N\$Si
276	N\$I
277	N\$X
278	O\$O

```

279  O$S
280  O$Cl
281  O$P
282  O$F
283  O$Br
284  O$Si
285  O$I
286  O$X
287  S$S
288  S$Cl
289  S$P
290  S$F
291  S$Br
292  S$Si
293  S$I
294  S$X
295  Cl$Cl
296  Cl$P
297  Cl$F
298  Cl$Br
299  Cl$Si
300  Cl$I
301  Cl$X
302  P$P
303  P$F
304  P$Br
305  P$Si
306  P$I
307  P$X
308  F$F
309  F$Br
310  F$Si
311  F$I
312  F$X
313  Br$Br
314  Br$Si
315  Br$I
316  Br$X
317  Si$Si
318  Si$I
319  Si$X
320  I$I
321  I$X
322  X$X

```

--OutDelim *comma | tab | semicolon*

Delimiter for output CSV/TSV text file(s). Possible values: *comma, tab, or semicolon* Default value: *comma*.

--output *SD | FP | text | all*

Type of output files to generate. Possible values: *SD, FP, text, or all*. Default value: *text*.

-o, --overwrite

Overwrite existing files.

-q, --quote *Yes | No*

Put quote around column values in output CSV/TSV text file(s). Possible values: *Yes or No*. Default value: *Yes*.

-r, --root *RootName*

New file name is generated using the root: <Root>.<Ext>. Default for new file names:

<SDFilename><MACCSKeysFP>.<Ext>. The file type determines <Ext> value. The sdf, fpf, csv, and tsv <Ext> values are used for SD, FP, comma/semicolon, and tab delimited text files, respectively. This option is ignored for multiple input files.

-s, --size *number*

Size of MACCS keys [ Ref 45-47 ] set to use during fingerprints generation. Possible values: *166 or 322*. Default value: *166*.

-v, --VectorStringFormat *ValuesString | IDsAndValuesString | IDsAndValuesPairsString | ValuesAndIDsString | ValuesAndIDsPairsString*

Format of fingerprints vector string data in output SD, FP or CSV/TSV text file(s) specified by --output used during *MACCSKeyCount* value of -m, --mode option. Possible values: *ValuesString, IDsAndValuesString | IDsAndValuesPairsString | ValuesAndIDsString | ValuesAndIDsPairsString*. Default value: *ValuesString*.

Examples:

```

FingerprintsVector;MACCSKeyCount;166;OrderedNumericalValues;ValuesString;
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 0 0 3 0 0 0 0 4 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0

```

```

0 0 0 0 1 1 8 0 0 0 1 0 0 1 0 1 0 3 1 3 1 0 0 0 1 2 0 11 1 0 0 0
5 0 0 1 2 0 1 1 0 0 0 0 0 1 1 0 1 1 1 1 0 4 0 0 1 1 0 4 6 1 1 1 2 1 1
3 5 2 2 0 5 3 5 1 1 2 5 1 2 1 2 4 8 3 5 5 2 2 0 3 5 4 1

FingerprintsVector:MACCSKeyCount;322;OrderedNumericalValues;ValuesString;14 8 2 0 2 0 4 4 2 1 4 0 0 2 5 10 5 2 1 0 0 2 0 5 13 3 28 5 5 3 0 0
0 4 2 1 1 0 1 1 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 22 5 3 0 0 0 1 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11 0 2 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...

```

`-w, --WorkingDir DirName`

Location of working directory. Default: current directory.

## EXAMPLES

To generate MACCS keys fingerprints of size 166 in binary bit-vector string format and create a SampleMACCS166FPBin.csv file containing sequential compound IDs along with fingerprints bit-vector strings data, type:

```
% MACCSKeysFingerprints.pl -r SampleMACCS166FPBin -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 in binary bit-vector string format and create SampleMACCS166FPBin.sdf, SampleMACCS166FPBin.csv and SampleMACCS166FPBin.csv files containing sequential compound IDs in CSV file along with fingerprints bit-vector strings data, type:

```
% MACCSKeysFingerprints.pl --output all -r SampleMACCS166FPBin
-o Sample.sdf
```

To generate MACCS keys fingerprints of size 322 in binary bit-vector string format and create a SampleMACCS322FPBin.csv file containing sequential compound IDs along with fingerprints bit-vector strings data, type:

```
% MACCSKeysFingerprints.pl -size 322 -r SampleMACCS322FPBin -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 corresponding to count of keys in ValuesString format and create a SampleMACCS166FPCount.csv file containing sequential compound IDs along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount -r SampleMACCS166FPCount
-o Sample.sdf
```

To generate MACCS keys fingerprints of size 322 corresponding to count of keys in ValuesString format and create a SampleMACCS322FPCount.csv file containing sequential compound IDs along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount -size 322
-r SampleMACCS322FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 in hexadecimal bit-vector string format with ascending bits order and create a SampleMACCS166FPHex.csv file containing compound IDs from MolName along with fingerprints bit-vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyBits --size 166 --BitStringFormat
HexadecimalString --BitsOrder Ascending --DataFieldsMode CompoundID
--CompoundIDMode MolName -r SampleMACCS166FPBin -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 corresponding to count of keys in IDsAndValuesString format and create a SampleMACCS166FPCount.csv file containing compound IDs from MolName line along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount --size 166
--VectorStringFormat IDsAndValuesString --DataFieldsMode CompoundID
--CompoundIDMode MolName -r SampleMACCS166FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 corresponding to count of keys in IDsAndValuesString format and create a SampleMACCS166FPCount.csv file containing compound IDs using specified data field along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount --size 166
--VectorStringFormat IDsAndValuesString --DataFieldsMode CompoundID
--CompoundIDMode DataField --CompoundID Mol_ID -r
SampleMACCS166FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 322 corresponding to count of keys in ValuesString format and create a SampleMACCS322FPCount.tsv file containing compound IDs derived from combination of molecule name line and an explicit compound prefix along with fingerprints vector strings data in a column labels MACCSKeyCountFP, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount -size 322 --DataFieldsMode
CompoundID --CompoundIDMode MolnameOrLabelPrefix --CompoundID Cmpd
--CompoundIDLabel MolID --FingerprintsLabel MACCSKeyCountFP --OutDelim
```

```
Tab -r SampleMACCS322FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 corresponding to count of keys in ValuesString format and create a SampleMACCS166FPCount.csv file containing specific data fields columns along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount --size 166
--VectorStringFormat ValuesString --DataFieldsMode Specify --DataFields
Mol_ID -r SampleMACCS166FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 322 corresponding to count of keys in ValuesString format and create a SampleMACCS322FPCount.csv file containing common data fields columns along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount --size 322
--VectorStringFormat ValuesString --DataFieldsMode Common -r
SampleMACCS322FPCount -o Sample.sdf
```

To generate MACCS keys fingerprints of size 166 corresponding to count of keys in ValuesString format and create SampleMACCS166FPCount.sdf, SampleMACCS166FPCount.fpf and SampleMACCS166FPCount.csv files containing all data fields columns in CSV file along with fingerprints vector strings data, type:

```
% MACCSKeysFingerprints.pl -m MACCSKeyCount --size 166 --output all
--VectorStringFormat ValuesString --DataFieldsMode All -r
SampleMACCS166FPCount -o Sample.sdf
```

## AUTHOR

Manish Sud <msud@san.rr.com>

## SEE ALSO

InfoFingerprintsFiles.pl, SimilarityMatricesFingerprints.pl, AtomNeighborhoodsFingerprints.pl, ExtendedConnectivityFingerprints.pl, PathLengthFingerprints.pl, TopologicalAtomPairsFingerprints.pl, TopologicalAtomTorsionsFingerprints.pl, TopologicalPharmacophoreAtomPairsFingerprints.pl, TopologicalPharmacophoreAtomTripletsFingerprints.pl

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