

# Package ‘edm1’

June 19, 2024

**Title** Set of statistical functions

**Version** 2.0.0.0

**Description** Provides functions to sort normal distribution data from an unordered dataframe, extract normal data from a random dataset, a function to calculate the probability of an event given a normal distribution...

**License** GPL (==3)

**Encoding** UTF-8

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.3.1

**Imports** stringr,  
stringi

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all_stat	<i>all_stat</i>
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## Description

Allow to see all the main statistics indicators (mean, median, variance, standard deviation, sum, max, min, quantile) of variables in a dataframe by the modality of a variable in a column of the input datarame. In addition to that, you can get the occurence of other qualitative variables by your chosen qualitative variable, you have just to precise it in the vector "stat\_var" where all the statistics indicators are given with "occu-var\_you\_want/".



```
#15
#16
```

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extract_normal	<i>extract_normal</i>
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## Description

Allow to extract values that fits a normal distribution from any kind of dataset, see examples and parameters

## Usage

```
extract_normal(
  inpt_datf,
  mean,
  sd,
  accuracy,
  round_value = 1,
  normalised = FALSE,
  n = NA,
  tries = 3
)
```

## Arguments

inpt_datf	is the input dataset as a dataframe, values/modalities are in the first column and frequency (not normalised) is in the second column
mean	is the mean of the target normal distribution
sd	is the standard deviation of the target normal distribution
accuracy	is how much of a difference between the points of the targeted normal distribution and the actual points is tolerated
round_value	is the round value for the normal distribution used under the hood to compare the dataset and extract the best points, defaults to 1
normalised	is if the input frequency is divided by n, if TRUE the parameter n must be filled
n	is the number of points
tries	is how many normal distributions are used under the hood to compare their points to the those in the input dataset, defaults to 3. The higher it is, the higher the number of different points from the input dataset will be in accordance for the normal distribution the function tries to build from the dataset. It does not increase by a lot but can be non-negligible and note that the higher the number of tries is, the higher the execution time of the function will be.

**Examples**

```

sample_val <- round(rnorm(n = 72000, mean = 12, sd = 2), 1)
sample_freq <- unique_total(sample_val)
sample_qual <- infinite_char_seq(n = length(sample_freq))
datf_test <- data.frame(sample_qual, sample_freq)
n <- nrow(datf_test)
print(datf_test)

```

	sample_qual	sample_freq
1	a	72
2	b	1155
3	c	1255
4	d	743
5	e	696
6	f	1028
7	g	1160
8	h	1219
9	i	1353
10	j	1336
11	k	1308
12	l	485
13	m	1306
14	n	1429
15	o	623
16	p	1172
17	q	1054
18	r	999
19	s	125
20	t	1461
21	u	1430
22	v	341
23	w	1453
24	x	427
25	y	869
26	z	1395
27	aa	841
28	ab	952
29	ac	246
30	ad	468
31	ae	237
32	af	555
33	ag	1297
34	ah	571
35	ai	349
36	aj	773
37	ak	1086
38	al	1281
39	am	1471
40	an	1236
41	ao	394
42	ap	1433
43	aq	1328
44	ar	976
45	as	640
46	at	308
47	au	698

48	av	864
49	aw	1346
50	ax	1349
51	ay	6
52	az	1071
53	ba	248
54	bb	929
55	bc	925
56	bd	452
57	be	207
58	bf	546
59	bg	62
60	bh	107
61	bi	1184
62	bj	739
63	bk	624
64	bl	850
65	bm	1408
66	bn	620
67	bo	202
68	bp	10
69	bq	700
70	br	397
71	bs	1291
72	bt	178
73	bu	397
74	bv	1089
75	bw	1301
76	bx	328
77	by	1348
78	bz	97
79	ca	1452
80	cb	4
81	cc	100
82	cd	593
83	ce	503
84	cf	164
85	cg	32
86	ch	259
87	ci	1089
88	cj	249
89	ck	165
90	cl	42
91	cm	143
92	cn	467
93	co	347
94	cp	143
95	cq	69
96	cr	18
97	cs	290
98	ct	55
99	cu	141
100	cv	86
101	cw	303
102	cx	88
103	cy	16
104	cz	213

105	da	3
106	db	75
107	dc	32
108	dd	66
109	de	105
110	df	34
111	dg	56
112	dh	17
113	di	22
114	dj	120
115	dk	54
116	dl	9
117	dm	8
118	dn	36
119	do	20
120	dp	26
121	dq	54
122	dr	8
123	ds	10
124	dt	4
125	du	53
126	dv	29
127	dw	1
128	dx	8
129	dy	10
130	dz	4
131	ea	22
132	eb	9
133	ec	17
134	ed	55
135	ee	21
136	ef	6
137	eg	4
138	eh	3
139	ei	7
140	ej	1
141	ek	4
142	el	2
143	em	5
144	en	4
145	eo	1
146	ep	2
147	eq	3
148	er	8
149	es	4
150	et	3
151	eu	3
152	ev	2
153	ew	2
154	ex	2
155	ey	1
156	ez	2
157	fa	2
158	fb	1

```
teste <- extract_normal(inpt_datf = datf_test,
                        mean = 10,
```

```

        sd = 2,
        accuracy = .1,
        round_value = 1,
        normalised = FALSE,
        tries = 5)

print(length(unique(teste[, 1])) / n)

[1] 0.2848101 # so nearly 28.5 % of the different points were in
#accordance with the construction of the target normal distribution

print(teste)

  values      frequency
1      dw 0.0001406866
2      dw 0.0001406866
3      dw 0.0001406866
4      el 0.0002813731
5      el 0.0002813731
6      el 0.0002813731
7      el 0.0002813731
8      da 0.0004220597
9      da 0.0004220597
10     cb 0.0005627462
11     cb 0.0005627462
12     em 0.0007034328
13     ay 0.0008441193
14     ay 0.0008441193
15     ei 0.0009848059
16     ei 0.0009848059
17     ei 0.0009848059
18     dm 0.0011254924
19     bp 0.0014068655
20     cy 0.0022509848
21     cy 0.0022509848
22     cy 0.0022509848
23     dh 0.0023916714
24     dh 0.0023916714
25     cr 0.0025323579
26     ee 0.0029544176
27     di 0.0030951041
28     dp 0.0036578503
29     dp 0.0036578503
30     cg 0.0045019696
31     cg 0.0045019696
32     df 0.0047833427
33     dn 0.0050647158
34     cl 0.0059088351
35     cl 0.0059088351
36     du 0.0074563872
37     du 0.0074563872
38     dg 0.0078784468
39     dg 0.0078784468
40     bg 0.0087225661
41     bg 0.0087225661
42     dd 0.0092853123
43     cq 0.0097073720

```

44	cq	0.0097073720
45	a	0.0101294316
46	cv	0.0120990433
47	cx	0.0123804164
48	cx	0.0123804164
49	bz	0.0136465954
50	cc	0.0140686550
51	bh	0.0150534609
52	bh	0.0150534609
53	dj	0.0168823860
54	s	0.0175858188
55	s	0.0175858188
56	cm	0.0201181767
57	cf	0.0230725943
58	ck	0.0232132808
59	bt	0.0250422060
60	bt	0.0250422060
61	be	0.0291221159
62	be	0.0291221159
63	cz	0.0299662352
64	cz	0.0299662352
65	be	0.0291221159
66	bo	0.0284186832
67	bt	0.0250422060
68	ck	0.0232132808
69	ck	0.0232132808
70	cm	0.0201181767
71	cu	0.0198368036
72	s	0.0175858188
73	dj	0.0168823860
74	bh	0.0150534609
75	bh	0.0150534609
76	de	0.0147720878
77	bz	0.0136465954
78	bz	0.0136465954
79	cx	0.0123804164
80	cv	0.0120990433
81	db	0.0105514913
82	a	0.0101294316
83	cq	0.0097073720
84	dd	0.0092853123
85	dd	0.0092853123
86	bg	0.0087225661
87	bg	0.0087225661
88	dg	0.0078784468
89	dk	0.0075970737
90	du	0.0074563872
91	cl	0.0059088351
92	cl	0.0059088351
93	dn	0.0050647158
94	df	0.0047833427
95	df	0.0047833427
96	cg	0.0045019696
97	dv	0.0040799100
98	dp	0.0036578503
99	di	0.0030951041
100	di	0.0030951041



```

101      ee 0.0029544176
102      cr 0.0025323579
103      dh 0.0023916714
104      cy 0.0022509848
105      cy 0.0022509848
106      cy 0.0022509848
107      cy 0.0022509848
108      dl 0.0012661790
109      dm 0.0011254924
110      ei 0.0009848059
111      ei 0.0009848059
112      ay 0.0008441193
113      ay 0.0008441193
114      em 0.0007034328
115      em 0.0007034328
116      cb 0.0005627462
117      cb 0.0005627462
118      da 0.0004220597
119      da 0.0004220597
120      el 0.0002813731
121      el 0.0002813731
122      el 0.0002813731
123      el 0.0002813731
124      dw 0.0001406866
125      dw 0.0001406866
126      dw 0.0001406866

```

---

how\_normal

*how\_normal*


---

## Description

Allow to get how much a sequence of numbers fit a normal distribution with chosen parameters, see examples

## Usage

```
how_normal(inpt_datf, normalised = TRUE, mean = 0, sd = 1)
```

## Arguments

inpt_datf	is the input dataframe containing all the values in the first column and their frequency (normalised or no), in the second column
normalised	is a boolean, takes TRUE if the frequency for each value is divided by n, FALSE if not
mean	is the mean of the normal distribution that the dataset tries to fit
sd	is the standard deviation of the normal distribution the dataset tries to fit

**Examples**

```
sample_val <- round(rnorm(n = 12000, mean = 6, sd = 1.25), 1)
sample_freq <- unique_total(sample_val)
datf_test <- data.frame(unique(sample_val), sample_freq)
print(datf_test)
```

	unique.sample_val.	sample_freq
1	6.9	306
2	8.3	63
3	7.7	148
4	5.6	363
5	6.5	349
6	4.6	202
7	6.6	324
8	6.7	335
9	6.0	406
10	5.7	365
11	7.9	109
12	6.2	420
13	5.9	386
14	4.5	185
15	5.1	326
16	6.1	360
17	5.5	346
18	6.3	375
19	7.4	207
20	7.6	162
21	4.2	129
22	3.9	102
23	5.2	325
24	2.3	7
25	5.8	387
26	6.4	319
27	9.1	21
28	7.0	280
29	8.8	27
30	4.9	218
31	8.1	98
32	3.0	25
33	8.4	66
34	4.3	160
35	7.2	267
36	8.7	40
37	5.3	313
38	4.1	127
39	5.0	275
40	4.0	119
41	9.3	13
42	4.4	196
43	6.8	313
44	7.1	247
45	3.5	57
46	7.8	139
47	3.6	57
48	7.5	189
49	7.3	215

50	4.7	230
51	3.2	36
52	9.5	8
53	3.8	79
54	8.2	62
55	5.4	343
56	8.5	55
57	4.8	207
58	3.7	79
59	8.6	33
60	3.3	38
61	3.4	43
62	8.9	21
63	8.0	105
64	3.1	23
65	9.0	27
66	10.0	5
67	2.5	10
68	2.9	16
69	9.7	7
70	2.7	11
71	10.5	1
72	9.4	13
73	9.2	16
74	2.6	16
75	9.9	3
76	2.8	10
77	2.4	10
78	1.9	2
79	2.0	6
80	10.2	2
81	9.6	3
82	11.3	1
83	1.8	1
84	2.2	3
85	2.1	2
86	1.6	1
87	10.6	1
88	9.8	1
89	10.4	1
90	1.7	1

```
print(how_normal(inpt_datf = datf_test,  
                 normalised = FALSE,  
                 mean = 6,  
                 sd = 1))
```

```
[1] 9.003683
```

```
print(how_normal(inpt_datf = datf_test,  
                 normalised = FALSE,  
                 mean = 5,  
                 sd = 1))
```

```
[1] 9.098484
```

---

how\_unif

*how\_unif*


---

**Description**

Allow to see how much a sequence of numbers fit a uniform distribution, see examples

**Usage**

```
how_unif(inpt_v, normalised = TRUE)
```

**Arguments**

`normalised` is a boolean, takes TRUE if the frequency for each value is divided by n, FALSE if not

`inpt_datf` is the input dataframe containing all the values in the first column and their frequencyu at the second column

**Examples**

```
sample_val <- round(runif(n = 12000, min = 24, max = 27), 1)
sample_freq <- unique_total(sample_val)
datf_test <- data.frame(unique(sample_val), sample_freq)
```

```
print(datf_test)
```

```
  unique.sample_val. sample_freq
1             24.4           400
2             24.8           379
3             25.5           414
4             26.0           366
5             26.6           400
6             25.7           419
7             24.3           389
8             24.1           423
9             26.1           404
10            26.5           406
11            26.2           356
12            26.8           407
13            24.6           388
14            25.3           402
15            26.3           388
16            25.4           422
17            25.0           436
18            25.9           373
19            25.2           423
20            25.6           388
21            27.0           202
22            24.2           380
23            24.9           404
24            25.1           417
25            26.4           401
26            26.7           431
27            24.5           392
```

```

28          24.0          218
29          26.9          407
30          25.8          371
31          24.7          394

print(how_unif(inpt_datf = datf_test, normalised = FALSE))

[1] 0.0752957

sample_val <- round(rnorm(n = 12000, mean = 24, sd = 7), 1)
sample_freq <- unique_total(sample_val)
datf_test <- data.frame(unique(sample_val), sample_freq)

print(how_unif(inpt_datf = datf_test, normalised = FALSE))

[1] 0.7797352

```

---

normal\_dens

*normal\_dens*


---

## Description

Calculates the normal distribution probability, see examples

## Usage

```
normal_dens(target_v = c(), mean, sd)
```

## Arguments

target_v	is the target value(s) (one or bounded), see examples
mean	is the mean of the normal distribution
sd	is the standard deviation of the normal distribution

## Examples

```

print(normal_dens(target_v = 13, mean = 12, sd = 2))

[1] 0.1760327

print(normal_dens(target_v = c(9, 11), mean = 12, sd = 1.5, step = 0.01))

[1] 0.2288579

print(normal_dens(target_v = c(1, 18), mean = 12, sd = 1.5, step = 0.01))

[1] 0.9999688

```

---

sort_normal_qual	<i>sort_normal_qual</i>
------------------	-------------------------

---

## Description

Sort qualitative modalities that have their frequency normally distributed from an unordered dataset, see examples. This function uses an another algorith than choose\_normal\_qual2 which may be faster.

## Usage

```
sort_normal_qual(inpt_datf)
```

## Arguments

`inpt_datf` is the input dataframe, containing the values in the first column and their frequency in the second

## Examples

```
sample_val <- round(rnorm(n = 2000, mean = 12, sd = 2), 1)
sample_freq <- unique_total(sample_val)
sample_qual <- infinite_char_seq(n = length(sample_freq))
datf_test <- data.frame(sample_qual, sample_freq)
datf_test[, 2] <- datf_test[, 2] / sum(datf_test[, 2]) # optional

print(datf_test)
```

	sample_qual	sample_freq
1	a	0.208695652
2	b	0.234782609
3	c	0.321739130
4	d	0.339130435
5	e	0.330434783
6	f	0.069565217
7	g	0.234782609
8	h	0.400000000
9	i	0.347826087
10	j	0.043478261
11	k	0.278260870
12	l	0.286956522
13	m	0.243478261
14	n	0.147826087
15	o	0.234782609
16	p	0.252173913
17	q	0.417391304
18	r	0.095652174
19	s	0.313043478
20	t	0.008695652
21	u	0.130434783
22	v	0.391304348
23	w	0.113043478
24	x	0.295652174
25	y	0.243478261

26	z	0.382608696
27	aa	0.008695652
28	ab	0.347826087
29	ac	0.330434783
30	ad	0.321739130
31	ae	0.347826087
32	af	0.321739130
33	ag	0.173913043
34	ah	0.278260870
35	ai	0.278260870
36	aj	0.347826087
37	ak	0.026086957
38	al	0.295652174
39	am	0.226086957
40	an	0.295652174
41	ao	0.234782609
42	ap	0.113043478
43	aq	0.234782609
44	ar	0.173913043
45	as	0.017391304
46	at	0.252173913
47	au	0.078260870
48	av	0.086956522
49	aw	0.278260870
50	ax	0.086956522
51	ay	0.200000000
52	az	0.295652174
53	ba	0.052173913
54	bb	0.165217391
55	bc	0.408695652
56	bd	0.269565217
57	be	0.104347826
58	bf	0.391304348
59	bg	0.104347826
60	bh	0.043478261
61	bi	0.200000000
62	bj	0.095652174
63	bk	0.191304348
64	bl	0.008695652
65	bm	0.165217391
66	bn	0.226086957
67	bo	0.086956522
68	bp	0.017391304
69	bq	0.121739130
70	br	0.234782609
71	bs	0.121739130
72	bt	0.078260870
73	bu	0.173913043
74	bv	0.104347826
75	bw	0.208695652
76	bx	0.017391304
77	by	0.243478261
78	bz	0.034782609
79	ca	0.017391304
80	cb	0.008695652
81	cc	0.173913043
82	cd	0.147826087

```

83      ce 0.060869565
84      cf 0.017391304
85      cg 0.060869565
86      ch 0.008695652
87      ci 0.208695652
88      cj 0.043478261
89      ck 0.052173913
90      cl 0.017391304
91      cm 0.017391304
92      cn 0.095652174
93      co 0.113043478
94      cp 0.017391304
95      cq 0.017391304
96      cr 0.026086957
97      cs 0.034782609
98      ct 0.017391304
99      cu 0.026086957
100     cv 0.026086957
101     cw 0.026086957
102     cx 0.017391304
103     cy 0.043478261
104     cz 0.008695652
105     da 0.034782609
106     db 0.017391304
107     dc 0.060869565
108     dd 0.008695652
109     de 0.008695652
110     df 0.017391304
111     dg 0.008695652
112     dh 0.008695652
113     di 0.017391304
114     dj 0.008695652
115     dk 0.008695652

```

```
print(sort_normal_qual(inpt_datf = datf_test))
```

```

0.00869565217391304 0.00869565217391304 0.00869565217391304 0.00869565217391304
      "aa"              "cb"              "cz"              "de"
0.00869565217391304 0.00869565217391304 0.0173913043478261 0.0173913043478261
      "dh"              "dk"              "bp"              "ca"
0.0173913043478261 0.0173913043478261 0.0173913043478261 0.0173913043478261
      "cl"              "cp"              "ct"              "db"
0.0173913043478261 0.0260869565217391 0.0260869565217391 0.0347826086956522
      "di"              "cr"              "cv"              "bz"
0.0347826086956522 0.0434782608695652 0.0434782608695652 0.0521739130434783
      "da"              "bh"              "cy"              "ck"
0.0608695652173913 0.0695652173913043 0.0782608695652174 0.0869565217391304
      "cg"              "f"              "bt"              "ax"
0.0956521739130435 0.0956521739130435 0.104347826086957 0.11304347826087
      "r"              "cn"              "bg"              "w"
0.11304347826087 0.121739130434783 0.147826086956522 0.165217391304348
      "co"              "bs"              "n"              "bb"
0.173913043478261 0.173913043478261 0.191304347826087 0.2
      "ag"              "bu"              "bk"              "bi"
0.208695652173913 0.226086956521739 0.234782608695652 0.234782608695652
      "bw"              "am"              "b"              "o"
0.234782608695652 0.243478260869565 0.243478260869565 0.252173913043478

```



"aq"	"m"	"by"	"at"
0.278260869565217	0.278260869565217	0.28695652173913	0.295652173913043
"k"	"ai"	"l"	"al"
0.295652173913043	0.321739130434783	0.321739130434783	0.330434782608696
"az"	"c"	"af"	"ac"
0.347826086956522	0.347826086956522	0.382608695652174	0.391304347826087
"i"	"ae"	"z"	"bf"
0.408695652173913	0.417391304347826	0.4	0.391304347826087
"bc"	"q"	"h"	"v"
0.347826086956522	0.347826086956522	0.339130434782609	0.330434782608696
"aj"	"ab"	"d"	"e"
0.321739130434783	0.31304347826087	0.295652173913043	0.295652173913043
"ad"	"s"	"an"	"x"
0.278260869565217	0.278260869565217	0.269565217391304	0.252173913043478
"aw"	"ah"	"bd"	"p"
0.243478260869565	0.234782608695652	0.234782608695652	0.234782608695652
"y"	"br"	"ao"	"g"
0.226086956521739	0.208695652173913	0.208695652173913	0.2
"bn"	"ci"	"a"	"ay"
0.173913043478261	0.173913043478261	0.165217391304348	0.147826086956522
"cc"	"ar"	"bm"	"cd"
0.130434782608696	0.121739130434783	0.11304347826087	0.104347826086957
"u"	"bq"	"ap"	"bv"
0.104347826086957	0.0956521739130435	0.0869565217391304	0.0869565217391304
"be"	"bj"	"bo"	"av"
0.0782608695652174	0.0608695652173913	0.0608695652173913	0.0521739130434783
"au"	"dc"	"ce"	"ba"
0.0434782608695652	0.0434782608695652	0.0347826086956522	0.0260869565217391
"cj"	"j"	"cs"	"cw"
0.0260869565217391	0.0260869565217391	0.0173913043478261	0.0173913043478261
"cu"	"ak"	"df"	"cx"
0.0173913043478261	0.0173913043478261	0.0173913043478261	0.0173913043478261
"cq"	"cm"	"cf"	"bx"
0.0173913043478261	0.00869565217391304	0.00869565217391304	0.00869565217391304
"as"	"dj"	"dg"	"dd"
0.00869565217391304	0.00869565217391304	0.00869565217391304	
"ch"	"bl"	"t"	

---

sort\_normal\_qual2    *sort\_normal\_qual2*

---

## Description

Sort qualitative modalities that have their frequency normally distributed from an unordered dataset, see examples. This function uses an another algorithm than choose\_normal\_qual which may be faster.

## Usage

```
sort_normal_qual2(inpt_datf)
```

## Arguments

`inpt_datf`    is the input dataframe, containing the values in the first column and their frequency in the second

**Examples**

```

sample_val <- round(rnorm(n = 2000, mean = 12, sd = 2), 1)
sample_freq <- unique_total(sample_val)
sample_qual <- infinite_char_seq(n = length(sample_freq))
datf_test <- data.frame(sample_qual, sample_freq)
datf_test[, 2] <- datf_test[, 2] / sum(datf_test[, 2])

print(datf_test)

```

```

      sample_qual sample_freq
1              a 0.208695652
2              b 0.234782609
3              c 0.321739130
4              d 0.339130435
5              e 0.330434783
6              f 0.069565217
7              g 0.234782609
8              h 0.400000000
9              i 0.347826087
10             j 0.043478261
11             k 0.278260870
12             l 0.286956522
13             m 0.243478261
14             n 0.147826087
15             o 0.234782609
16             p 0.252173913
17             q 0.417391304
18             r 0.095652174
19             s 0.313043478
20             t 0.008695652
21             u 0.130434783
22             v 0.391304348
23             w 0.113043478
24             x 0.295652174
25             y 0.243478261
26             z 0.382608696
27            aa 0.008695652
28            ab 0.347826087
29            ac 0.330434783
30            ad 0.321739130
31            ae 0.347826087
32            af 0.321739130
33            ag 0.173913043
34            ah 0.278260870
35            ai 0.278260870
36            aj 0.347826087
37            ak 0.026086957
38            al 0.295652174
39            am 0.226086957
40            an 0.295652174
41            ao 0.234782609
42            ap 0.113043478
43            aq 0.234782609
44            ar 0.173913043
45            as 0.017391304
46            at 0.252173913

```

47	au	0.078260870
48	av	0.086956522
49	aw	0.278260870
50	ax	0.086956522
51	ay	0.200000000
52	az	0.295652174
53	ba	0.052173913
54	bb	0.165217391
55	bc	0.408695652
56	bd	0.269565217
57	be	0.104347826
58	bf	0.391304348
59	bg	0.104347826
60	bh	0.043478261
61	bi	0.200000000
62	bj	0.095652174
63	bk	0.191304348
64	bl	0.008695652
65	bm	0.165217391
66	bn	0.226086957
67	bo	0.086956522
68	bp	0.017391304
69	bq	0.121739130
70	br	0.234782609
71	bs	0.121739130
72	bt	0.078260870
73	bu	0.173913043
74	bv	0.104347826
75	bw	0.208695652
76	bx	0.017391304
77	by	0.243478261
78	bz	0.034782609
79	ca	0.017391304
80	cb	0.008695652
81	cc	0.173913043
82	cd	0.147826087
83	ce	0.060869565
84	cf	0.017391304
85	cg	0.060869565
86	ch	0.008695652
87	ci	0.208695652
88	cj	0.043478261
89	ck	0.052173913
90	cl	0.017391304
91	cm	0.017391304
92	cn	0.095652174
93	co	0.113043478
94	cp	0.017391304
95	cq	0.017391304
96	cr	0.026086957
97	cs	0.034782609
98	ct	0.017391304
99	cu	0.026086957
100	cv	0.026086957
101	cw	0.026086957
102	cx	0.017391304
103	cy	0.043478261

```

104      cz 0.008695652
105      da 0.034782609
106      db 0.017391304
107      dc 0.060869565
108      dd 0.008695652
109      de 0.008695652
110      df 0.017391304
111      dg 0.008695652
112      dh 0.008695652
113      di 0.017391304
114      dj 0.008695652
115      dk 0.008695652

```

```
print(sort_normal_qual2(inpt_datf = datf_test))
```

```

0.00869565217391304 0.00869565217391304 0.00869565217391304 0.00869565217391304
      "aa"      "cb"      "cz"      "de"
0.00869565217391304 0.00869565217391304 0.0173913043478261 0.0173913043478261
      "dh"      "dk"      "bp"      "ca"
0.0173913043478261 0.0173913043478261 0.0173913043478261 0.0173913043478261
      "cl"      "cp"      "ct"      "db"
0.0173913043478261 0.0260869565217391 0.0260869565217391 0.0347826086956522
      "di"      "cr"      "cv"      "bz"
0.0347826086956522 0.0434782608695652 0.0434782608695652 0.0521739130434783
      "da"      "bh"      "cy"      "ck"
0.0608695652173913 0.0695652173913043 0.0782608695652174 0.0869565217391304
      "cg"      "f"      "bt"      "ax"
0.0956521739130435 0.0956521739130435 0.104347826086957 0.11304347826087
      "r"      "cn"      "bg"      "w"
0.11304347826087 0.121739130434783 0.147826086956522 0.165217391304348
      "co"      "bs"      "n"      "bb"
0.173913043478261 0.173913043478261 0.191304347826087 0.2
      "ag"      "bu"      "bk"      "bi"
0.208695652173913 0.226086956521739 0.234782608695652 0.234782608695652
      "bw"      "am"      "b"      "o"
0.234782608695652 0.243478260869565 0.243478260869565 0.252173913043478
      "aq"      "m"      "by"      "at"
0.278260869565217 0.278260869565217 0.28695652173913 0.295652173913043
      "k"      "ai"      "l"      "al"
0.295652173913043 0.321739130434783 0.321739130434783 0.330434782608696
      "az"      "c"      "af"      "ac"
0.347826086956522 0.347826086956522 0.382608695652174 0.391304347826087
      "i"      "ae"      "z"      "bf"
0.408695652173913 0.417391304347826 0.4 0.391304347826087
      "bc"      "q"      "h"      "v"
0.347826086956522 0.347826086956522 0.339130434782609 0.330434782608696
      "aj"      "ab"      "d"      "e"
0.321739130434783 0.31304347826087 0.295652173913043 0.295652173913043
      "ad"      "s"      "an"      "x"
0.278260869565217 0.278260869565217 0.269565217391304 0.252173913043478
      "aw"      "ah"      "bd"      "p"
0.243478260869565 0.234782608695652 0.234782608695652 0.234782608695652
      "y"      "br"      "ao"      "g"
0.226086956521739 0.208695652173913 0.208695652173913 0.2
      "bn"      "ci"      "a"      "ay"
0.173913043478261 0.173913043478261 0.165217391304348 0.147826086956522
      "cc"      "ar"      "bm"      "cd"

```

0.130434782608696	0.121739130434783	0.11304347826087	0.104347826086957
"u"	"bq"	"ap"	"bv"
0.104347826086957	0.0956521739130435	0.0869565217391304	0.0869565217391304
"be"	"bj"	"bo"	"av"
0.0782608695652174	0.0608695652173913	0.0608695652173913	0.0521739130434783
"au"	"dc"	"ce"	"ba"
0.0434782608695652	0.0434782608695652	0.0347826086956522	0.0260869565217391
"cj"	"j"	"cs"	"cw"
0.0260869565217391	0.0260869565217391	0.0173913043478261	0.0173913043478261
"cu"	"ak"	"df"	"cx"
0.0173913043478261	0.0173913043478261	0.0173913043478261	0.0173913043478261
"cq"	"cm"	"cf"	"bx"
0.0173913043478261	0.00869565217391304	0.00869565217391304	0.00869565217391304
"as"	"dj"	"dg"	"dd"
0.00869565217391304	0.00869565217391304	0.00869565217391304	
"ch"	"bl"	"t"	

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