

calculator/calculator.py

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1 # 図5の作成
2 # 各ボタン間の平均距離、IDを計算する。
3 # 実移動距離を計算する。
4 # 実入力時間を計算する。
5 # 時間の単位は全てms
6
7 # fitts/approximation.py より、MT = 176.386 * ID + 285.871 とする。
8 def make_mt(id):
9     return 176.386 * id + 285.871
10
11 # 予測総入力時間 = M + 48 * MT
12 def total_ms(mt):
13     return 6 * mt + M
14
15 # KLMより M = 1.2 s
16 M = 1200
17
18 # KLM を使用 -----
19 P = 1100
20 B = 100
21 total_klm = M + 6 * (P + B*2)
22
23
24
25 import csv
26 import math
27
28
29
30 # 各ボタン間平均距離を使用 -----
31 f = open('calculator/buttons.csv', 'r', encoding='utf-8')
32 buttons = csv.reader(f)
33 header = next(buttons)
34 width = int(header[1])
35 next(buttons)
36
37 # 要素毎にリストに振り分ける
38 start = []
39 number = []
40 operator = []
41 equal = []
42 for b in buttons:
43     if b[0] == 'START':
44         start.append(b)
45     elif b[0].isdigit() and int(b[0]) >= 0 and int(b[0]) <= 9:
46         number.append(b)
47     elif b[0] == '=':
48         equal.append(b)
49     else:
50         operator.append(b)
51
52 # no1 start to num
53 for row in start:
54     tmp = []
55     for row2 in number:
56         x = (int(row[1]) - int(row2[1]))**2

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57         y = (int(row[2]) - int(row2[2]))**2
58         dis = math.sqrt(x + y)
59         tmp.append(dis)
60     total = sum(tmp)
61     no1 = total/len(number)
62
63 # no2 num to num
64 tmp2 = []
65 for i in range(len(number)):
66     for j in range(len(number)):
67         if i != j:
68             x = (int(number[i][1]) - int(number[j][1]))**2
69             y = (int(number[i][2]) - int(number[j][2]))**2
70             dis = math.sqrt(x + y)
71             tmp2.append(dis)
72 no2 = sum(tmp2)/(len(number)-1)**2
73
74 # no3 num to ope
75 tmp3 = []
76 for row in number:
77     for row2 in operator:
78         x = (int(row[1]) - int(row2[1]))**2
79         y = (int(row[2]) - int(row2[2]))**2
80         dis = math.sqrt(x + y)
81         tmp3.append(dis)
82 no3 = sum(tmp3)/(len(number) * len(operator))
83
84 # no4 ope to num
85 no4 = no3
86
87 # no5 num to equal
88 tmp4 = []
89 for row in equal:
90     for row2 in number:
91         x = (int(row[1]) - int(row2[1]))**2
92         y = (int(row[2]) - int(row2[2]))**2
93         dis = math.sqrt(x + y)
94         tmp4.append(dis)
95 no5 = sum(tmp4)/(len(number) * len(equal))
96
97 ave = round((no1 + no2 + no3 + no4 + no5)/5, 3)
98 ID = round(math.log2((ave/width) + 1), 3)
99 MT = round(make_mt(ID), 3)
100 TOTAL = round(total_ms(MT), 3)
101
102
103 # 実移動距離を使用 -----
104 f2 = open('calculator/log.csv', 'r', encoding='utf-8')
105 log = csv.reader(f2)
106 next(log)
107 distance2 = []
108 time = []
109
110 for row in log:
111     distance2.append(int(row[2]))
112     time.append(int(row[1]))
113
114 real_time = round(sum(time)/8, 3)
115 N2 = len(distance2)
116 total_real = round(sum(distance2)/N2, 3)

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117 ID2 = round(math.log2((total_real/width) + 1), 3)
118 MT2 = round(make_mt(ID2), 3)
119 TOTAL2 = round(total_ms(MT2), 3)
120
121
122 # 表示 -----
123 print('平均入力時間:', real_time, 'ms')
124 print('')
125 print('予測1 -----')
126 print('予測入力時間', total_klm, 'ms')
127 print('')
128 print('予測2 -----')
129 print('各ボタン間平均移動距離:', ave)
130 print('ID:', ID)
131 print('予測MT:', MT, 'ms')
132 print('予測入力時間:', TOTAL, 'ms')
133 print('')
134 print('予測3 -----')
135 print('平均実移動距離:', total_real)
136 print('ID:', ID2)
137 print('予測MT:', MT2, 'ms')
138 print('予測入力時間:', TOTAL2, 'ms')
139
140
141 f.close()
142 f2.close()
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