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1 # 114-1 程式設計與統計軟體
2 # HW3: 2025/11/13
3
4 # ex2.55# ex2.55: solution 1
5
6 fee_rule <- function(d){
7   if(d < 50){
8     fee <- 100
9   }else if(d > 50 & d <= 300){
10    fee <- 100 + (d - 50) * 1
11  }else if(d > 300){
12    fee <- 400
13  }
14  fee
15 }
16
17 compute_fee_table <- function(x){
18   no_city <- length(x)
19   fee_table <- matrix(0, no_city, no_city)
20   for(i in 1:no_city) {
21     for(j in 1:no_city){
22       fee_table[i, j] <- fee_rule(abs(x[i]-x[j]))
23     }
24   }
25   rownames(fee_table) <- colnames(fee_table) <- c(LETTERS[1:no_city])
26   fee_table
27 }
28 }
29 city <- c(25, 49, 95, 178, 264, 327, 373)
30 compute_fee_table(city)
31
32
33 # ex2.55: solution 2
34 compute_fare <- function(exit_dist) {
35   no <- length(exit_dist)
36   a <- matrix(exit_dist, ncol = no, nrow = no, byrow = TRUE)
37   b <- matrix(exit_dist, ncol = no, nrow = no)
38   city_dist <- abs(a - b)
39   price_table <- ifelse(city_dist < 50, 100,
40                         ifelse(city_dist > 300, 400,
41                               100 + (city_dist - 50) * 1))
42   rownames(price_table) <- colnames(price_table) <- c(LETTERS[1:no])
43   price_table
44 }
45 exit_dist <- c(25, 49, 95, 178, 264, 327, 373)
46 compute_fare(exit_dist)
47
48
49
50
51 # ex4.4(a)
52 library(readxl)
53 tmp <- read_excel("data/SalaryGov.xlsx", sheet = 1, range = "A1:AI1")
54 industry <- names(tmp)[seq(2, 35, 2)]
55 gender <- c("男", "女")
56 cn <- c("日期", paste(rep(industry, each = 2), gender, sep = "_"))
57
58 SalaryMonth <- read_excel("data/SalaryGov.xlsx", sheet = 1, range = "A3:AI76")
59 colnames(SalaryMonth) <- cn
60
61 TotalWorkHour <- read_excel("data/SalaryGov.xlsx", sheet = 2, range = "A3:AI76")
62 colnames(TotalWorkHour) <- cn
63
64 head(SalaryMonth[, 1:5], 5)
65 tail(SalaryMonth[, 1:5], 5)
66 head(TotalWorkHour[, 1:5], 5)
67 tail(TotalWorkHour[, 1:5], 5)

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68
69
70 # ex4.4(b)
71 library(ggplot2)
72 library(gridExtra)
73 n <- nrow(SalaryMonth)
74 SalaryMonth_tidy <- data.frame(日期 = SalaryMonth$日期,
75                                教育服務業 = c(SalaryMonth$教育服務業_男,
76                                                SalaryMonth$教育服務業_女),
77                                性別 = rep(c("男", "女"), each=n))
78 i1 <- ggplot(SalaryMonth_tidy, aes(x = 1:(2*n), y = 教育服務業, color = 性別)) +
79   geom_point() +
80   labs(title = "教育服務業：每人每月總薪資(新臺幣元)",
81        x = "index", y = "新臺幣元")
82
83
84 TotalWorkHour_tidy <- data.frame(日期 = TotalWorkHour$日期,
85                                教育服務業 = c(TotalWorkHour$教育服務業_男,
86                                                TotalWorkHour$教育服務業_女),
87                                性別 = rep(c("男", "女"), each=n))
88 i2 <- ggplot(TotalWorkHour_tidy, aes(x = 1:(2*n), y = 教育服務業, color = 性別)) +
89   geom_point() +
90   labs(title = "教育服務業：總工時(小時)",
91        x = "index", y = "小時")
92
93
94 grid.arrange(i1, i2, nrow=1, ncol=2)
95
96
97 # ex4.4(c)
98 id <- grep("105", SalaryMonth$日期)
99 no.id <- length(id)
100
101 SalaryMonth_tidy2 <- data.frame(日期 = factor(SalaryMonth[id, ]$日期,
102                                              levels= SalaryMonth[id, ]$日期,
103                                              ordered = T),
104                                行業別 = rep(c("資訊及通訊傳播業", "金融及保險業", "教育服務
105業"), each = no.id),
106                                每人每月總薪資 = c(SalaryMonth[id, ]$資訊及通訊傳播業_男,
107SalaryMonth[id, ]$金融及保險業_男, SalaryMonth[id, ]$教育服務業_男))
108
109 ggplot(SalaryMonth_tidy2, aes(x = 日期, y = 每人每月總薪資, color = 行業別,
110                                group = 行業別)) +
111   geom_line(aes(linetype = 行業別)) +
112   geom_point() +
113   theme(legend.position = "top") +
114   labs(title = "105年，每人每月總薪資(新臺幣元)：三行業之時間序列圖",
115        x = "日期", y = "新臺幣元")
116
117
118 # ex4.4(d)
119 TotalWorkHour.m.industry <- stack(TotalWorkHour[seq(2, 35, 2)])
120
121 ggplot(TotalWorkHour.m.industry, aes(x=ind, y=values)) +
122   geom_boxplot() +
123   theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
124   labs(title = "「男性在行業別的總工時(小時)」盒形圖",
125        x = "行業別", y = "總工時(小時)")
126
127
128 # ex4.4(e)
129 SalaryMonth_m_industry <- stack(SalaryMonth[seq(2, 35, 2)])
130
131 ans <- tapply(SalaryMonth_m_industry$values, SalaryMonth_m_industry$ind, median)
132 SalaryMonth_m_industry.med <- data.frame(行業別 = names(ans),
133                                           每月總薪資中位數 = c(ans))
134
135 ggplot(SalaryMonth_m_industry.med, aes(x=行業別, y=每月總薪資中位數)) +

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133     geom_bar(stat = "identity") +
134     theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
135     labs(title = "「男性在行業別的每人每月總薪資(新臺幣元)」中位數之長條圖",
136           x = "行業別", "新臺幣元")
137
138
139
140 # ex4.6
141 x <- seq(-10, 10, 0.1)
142 sigmoid <- 1 / (1 + exp(-x))
143 tanh <- (exp(x) - exp(-x)) / (exp(x) + exp(-x))
144 Relu <- ifelse(x >= 0, x, 0)
145 af.df <- data.frame(x, sigmoid, tanh, Relu)
146
147 a1 <- ggplot(af.df, aes(x = x, y = sigmoid)) +
148   geom_hline(yintercept = 0, color = "grey") +
149   geom_vline(xintercept = 0, color = "grey") +
150   geom_line(size = 2) +
151   labs(title = "sigmoid")
152
153
154 a2 <- ggplot(af.df, aes(x = x, y = tanh)) +
155   geom_hline(yintercept = 0, color = "grey") +
156   geom_vline(xintercept = 0, color = "grey") +
157   geom_line(size = 2) +
158   labs(title = "tanh")
159
160 a3 <- ggplot(af.df, aes(x = x, y = Relu)) +
161   geom_hline(yintercept = 0, color = "grey") +
162   geom_vline(xintercept = 0, color = "grey") +
163   geom_line(size = 2) +
164   labs(title = "Relu")
165
166 library(gridExtra)
167 grid.arrange(a1, a2, a3, nrow = 1, ncol = 3)
168
169
170
171
172
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