Project 2 Cloud Data Code Appendix

Yicheng Shen (Student ID: 2806571) & Yunhong Bao (Student ID: 2427527)

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EDA

```r
image_1 <- read.table("image_data/imagem1.txt")
image_2 <- read.table("image_data/imagem2.txt")
image_3 <- read.table("image_data/imagem3.txt")
var_name <- c("Y_coord", "X_coord", "Cloud", "NDAI", "SD", "CORR", "DF","CF","BF","AF","AN")
colnames(image_1) = colnames(image_2) = colnames(image_3) <- var_name
image_1$Cloud <- factor(image_1$Cloud)
image_2$Cloud <- factor(image_2$Cloud)
image_3$Cloud <- factor(image_3$Cloud)
```

```r
summary(image_1)
summary(image_2)
summary(image_3)
dim(image_1)
dim(image_2)
dim(image_3)
```

```r
any(apply(image_1, 2, is.na))
any(apply(image_2, 2, is.na))
any(apply(image_3, 2, is.na))
```

```r
# image_1 %>%
# ggplot() + geom_boxplot(aes(x=Cloud, y=SD))

all_image <- rbind(image_1 %>% mutate(image = "1"), image_2 %>% mutate(image = "2"), image_3 %>% mutate

all_image%>%
  ggplot() + geom_boxplot(aes(x=Cloud, y=NDAI, color = image))

all_image %>%
  ggplot() + geom_boxplot(aes(x=Cloud, y=SD, color = image))

all_image %>%
  ggplot() + geom_boxplot(aes(x=Cloud, y=CORR, color = image))
```

```r
image_1 %>%
  select(Cloud, NDAI, SD, CORR) %>% ggpairs()
```

```r
image_2 %>%
  select(Cloud, NDAI, SD, CORR) %>% ggpairs()

image_3 %>%
  select(Cloud, NDAI, SD, CORR) %>% ggpairs()
```

```r
# library(sf)
# ggplot(data = world) +
#     geom_sf() +
#     geom_point(data = image_1, aes(x = X-coord, y = Y-coord), size = 4,
#         shape = 23, fill = "darkred") +
#     coord_sf(xlim = c(-88, -78), ylim = c(0, 33), expand = FALSE)

Palette_1 <- c("gray","black", "white")

map_1 <- image_1 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size = 0.5) +
  theme_map() + theme(legend.position = "none") +
  labs(title = "Image 1", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_1)

map_2 <- image_2 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size =  0.5) +
  theme_map() + theme(legend.position = "none") +
  labs(title = "Image 2", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_1)

map_3 <- image_3 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size = 0.5) +
  theme_map() + theme(legend.position = "none") +
  labs(title = "Image 3", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_1)
# map_1
# map_2
# map_3
```

```r
grid.arrange(arrangeGrob(map_1 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         map_2 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         map_3 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         nrow = 1))
```

Better map?

```r
Palette_2 <- c("gray", "white")

map1 <- image_1 %>%
  filter(Cloud != 0) %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size = 0.5) +
  theme_dark() + labs(title = "Image 1", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_2)

map2 <- image_2 %>%
  filter(Cloud != 0) %>%
```

```r
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size = 0.5) +
  theme_dark() + labs(title = "Image 2", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_2)

map3 <- image_3 %>%
  filter(Cloud != 0) %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = Cloud), size = 0.5) +
  theme_dark() + labs(title = "Image 3", x = "X Coordinate", y = "Y Coordinate") +
  scale_colour_manual(values = Palette_2)
# map1
# map2
# map3
```

```r
map_legend <- lemon::g_legend(map1 +  guides(colour = guide_legend(nrow = 1)))

grid.arrange(arrangeGrob(map1 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         map2 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         map3 + ggeasy::easy_center_title() + theme(legend.position="none"),
                         nrow = 1),
             map_legend, nrow = 2, heights = c(10, 1))
```

```r
NDAI_plot <- image_1 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = NDAI), size = 0.5) +
  theme_map() + labs(title = "Image 1", x = "X Coordinate", y = "Y Coordinate")

SD_plot <- image_1 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = SD), size = 0.5) +
  theme_map() + labs(title = "Image 1", x = "X Coordinate", y = "Y Coordinate")

CORR_plot <- image_1 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = CORR), size = 0.5) +
  theme_map() + labs(title = "Image 1", x = "X Coordinate", y = "Y Coordinate")


grid.arrange(NDAI_plot + ggeasy::easy_center_title(),
             SD_plot + ggeasy::easy_center_title(),
             CORR_plot + ggeasy::easy_center_title(),
             nrow = 1)
```

```r
NDAI_plot <- image_2 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = NDAI), size = 0.5) +
  theme_map() + labs(title = "Image 2", x = "X Coordinate", y = "Y Coordinate")

SD_plot <- image_2 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = SD), size = 0.5) +
  theme_map() + labs(title = "Image 2", x = "X Coordinate", y = "Y Coordinate")

CORR_plot <- image_2 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = CORR), size = 0.5) +
  theme_map() + labs(title = "Image 2", x = "X Coordinate", y = "Y Coordinate")

grid.arrange(NDAI_plot + ggeasy::easy_center_title(),
             SD_plot + ggeasy::easy_center_title(),
```

```
              CORR_plot + ggeasy::easy_center_title(),
              nrow = 1)


NDAI_plot <- image_3 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = NDAI), size = 0.5) +
  theme_map() + labs(title = "Image 3", x = "X Coordinate", y = "Y Coordinate") + scale_color_gradient(

SD_plot <- image_3 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = SD), size = 0.5) +
  theme_map() + labs(title = "Image 3", x = "X Coordinate", y = "Y Coordinate") + scale_color_gradient(

CORR_plot <- image_3 %>%
  ggplot() + geom_point(aes(x = X_coord, y = Y_coord, color = CORR), size = 0.5) +
  theme_map() + labs(title = "Image 3", x = "X Coordinate", y = "Y Coordinate") + scale_color_gradient(

grid.arrange(NDAI_plot + ggeasy::easy_center_title(),
              SD_plot + ggeasy::easy_center_title(),
              CORR_plot + ggeasy::easy_center_title(),
              nrow = 1)
```

Model Fitting

```
M1.glm <- glm(Cloud ~ NDAI + SD + CORR, data = all_image, family = 'binomial')
summary(M1.glm)


M2.glm <- glm(Cloud ~ NDAI + SD + CORR, data = all_image %>% filter(Cloud != 0), family = 'binomial')
summary(M2.glm)
```