Image Processing, Word Cloud, and Network Analysis

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1 Image Processing

In this section, we demonstrate how an image was processed using R, including resizing, splitting, and annotating the image.

Code

```r
options(warn = -1)
library(ggplot2)
library(grid)
library(magick)
image_path <- "ShowPic.png"

original_image <- image_read(image_path)

# Resize and process image
resized_image <- image_scale(original_image, "400x400")
image_width <- as.numeric(image_info(resized_image)$width)
image_height <- as.numeric(image_info(resized_image)$height)
left_half <- image_crop(resized_image, paste0(image_width / 2, "x", image_height, "+0+0"))
right_half <- image_crop(resized_image, paste0(image_width / 2, "x", image_height, "+", image_width / 2, "+0"))
right_half <- image_convert(right_half, colorspace = "gray")
combined_image <- image_append(c(left_half, right_half), stack = FALSE)
final_image <- image_annotate(combined_image, "The next president of Taiwan", size = 20, gravity = "north", color = "orange", boxcolor = "black")
#I just dont have any islamic pic
knitr::include_graphics("processed_image.png")

#         RGB
resized_image <- image_scale(original_image, "600x400")
r_image <- image_modulate(resized_image, brightness = 100, saturation = 100, hue = 0)
g_image <- image_modulate(resized_image, brightness = 100, saturation = 100, hue = 120)
b_image <- image_modulate(resized_image, brightness = 100, saturation = 100, hue = 240)

#
r_image_rotated <- image_scale(image_rotate(r_image, 90), "150x150")
g_image_rotated <- image_scale(image_rotate(g_image, 180), "300x325")
b_image_rotated <- image_scale(image_rotate(b_image, 0), "300x325")

#         GIF
```

```
33  rgb_animation <- image_animate(c(g_image_rotated, b_image_
        rotated, r_image_rotated), fps = 1)
34  image_write(rgb_animation, path = "rgb_animation.gif", format =
        "gif")
35  library(magick)
36  animation <- image_read("rgb_animation.gif")
37  image_write(animation, path = "frame_%02d.png", format = "png")
38
39  #             HTML
40  knitr::include_graphics("rgb_animation.gif")
```


Figure 1: Original Image

The processed image with annotation is shown below:

Figure 2: Processed Image with Annotation

2 Word Cloud

In this section, we generated a word cloud from the titles of news articles using the provided dataset. The most frequently occurring words are highlighted.

Code

```r
library("NLP")
library("tm")
library("SnowballC")
library("RColorBrewer")
library("wordcloud")

data <- read.csv("FakeNewsNet.csv", stringsAsFactors = FALSE)
text <- na.omit(data$title)
text <- text[1:1000]
docs <- Corpus(VectorSource(text))
toSpace <- content_transformer(function(x, pattern) gsub(pattern,
    " ", x))
docs <- tm_map(docs, toSpace, "/")
docs <- tm_map(docs, toSpace, "@")
#docs <- tm_map(docs, "\\|", toSpace)
docs <- tm_map(docs, content_transformer(tolower))
docs <- tm_map(docs, removeNumbers)
docs <- tm_map(docs, removeWords, stopwords("english"))
docs <- tm_map(docs, removePunctuation)
docs <- tm_map(docs, stripWhitespace)
dtm <- TermDocumentMatrix(docs, control = list(wordLengths = c(3,
    Inf)))
m <- as.matrix(dtm)
v <- sort(rowSums(m), decreasing = TRUE)
d <- data.frame(word = names(v), freq = v)
png("wordcloud.png", width = 800, height = 600)
knitr::include_graphics("wordcloud.png")
wordcloud(words = d$word, freq = d$freq, min.freq = 1, max.words =
    75, random.order = FALSE, rot.per = 0, scale = c(2.4, 0.35),
    colors = brewer.pal(8, "Dark2"))
dev.off()
```

Figure 3: Generated Word Cloud

3 Network Analysis

This section analyzes a dataset of relationships, creating a network graph to visualize connections between nodes (teams or entities).

Code

```r
library(igraph)
file_path <- "results.csv"
data <- read.csv(file_path)
data <- subset(data, tournament == "AFC Asian Cup")
data <- data.frame(winner = ifelse(data$home_score > data$away_
    score, data$home_team, data$away_team), loser = ifelse(data$
    home_score > data$away_score, data$away_team, data$home_team),
    date = as.Date(data$date))
library(dplyr)
y <- data %>% group_by(winner, loser) %>% summarise(weight = n(),
    .groups = 'drop')
y <- y %>% arrange(winner, loser) %>% filter(!duplicated(paste(
    pmin(winner, loser), pmax(winner, loser))))
net <- graph.data.frame(y, directed = TRUE)
V(net)$label <- V(net)$name
V(net)$degree <- degree(net, mode = "all")
net <- delete.vertices(net, V(net)[degree(net, mode = "out") < 5])
png("network_graph.png", width = 800, height = 600)
knitr::include_graphics("network_graph.png")
plot(net, layout = layout_with_fr, vertex.color = rainbow(length(V
    (net))), vertex.size = log(V(net)$degree + 1) * 6, edge.arrow.
    size = 0.3, vertex.label.cex = 0.8, vertex.label.color = "black
    ", main = "AFC Asian Cup Network Graph")
dev.off()
knitr::include_graphics("network_graph.png")
```
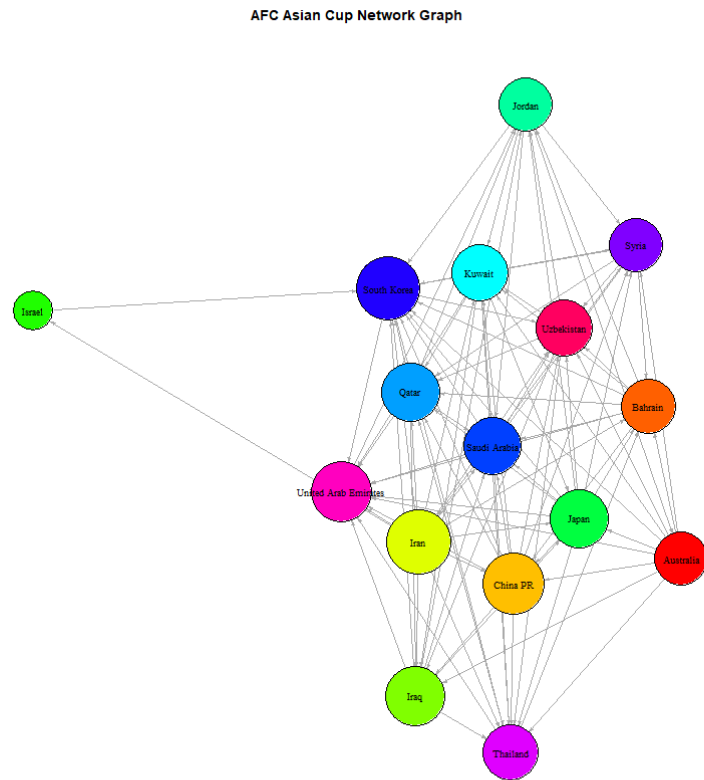
Figure 4: Network Analysis Graph