651 project

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```
# df <- rat[, -ncol(rat)]
df <- rat

# Add row number before pivoting
df$row <- seq_len(nrow(df))

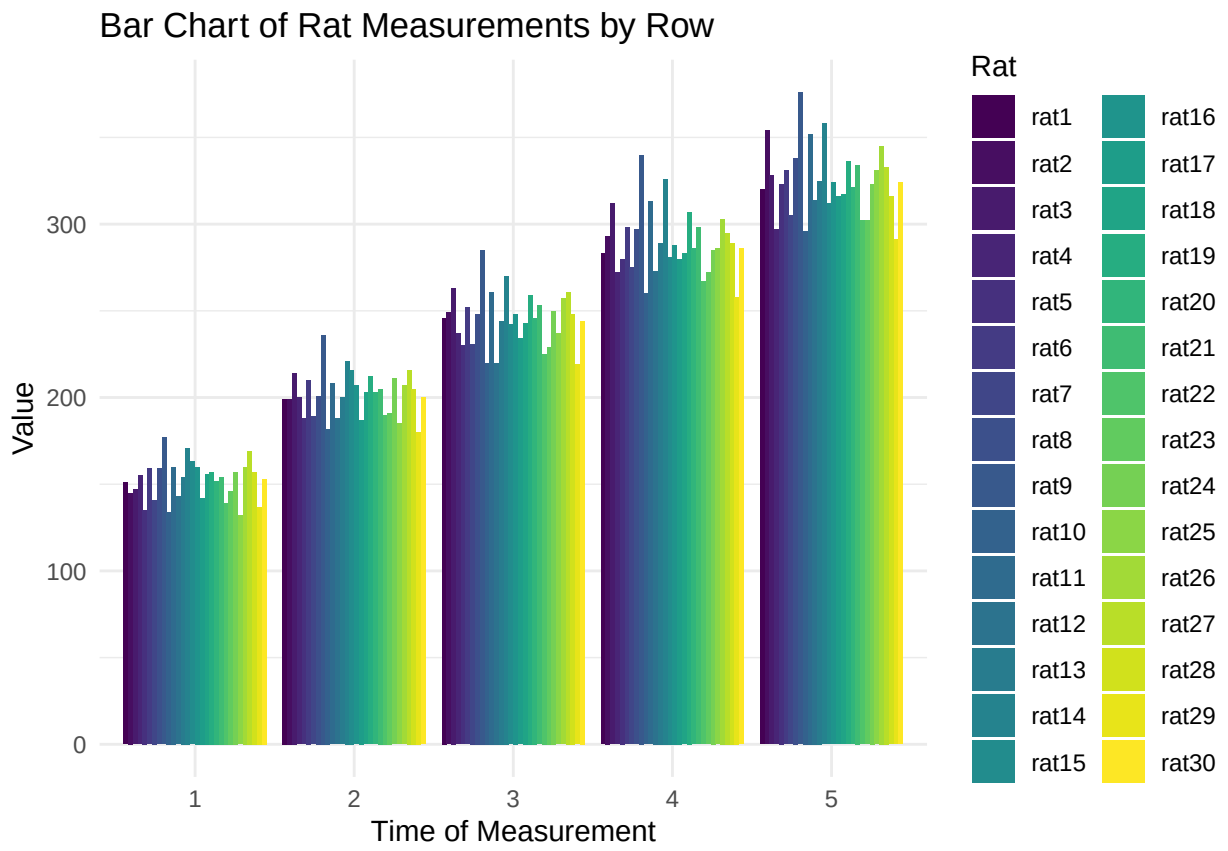
#get rid of age column
df <- df[, -which(names(df) == "age")]

# Pivot longer
df_long <- pivot_longer(df, cols = -row, names_to = "Rat", values_to = "Value")




df_long <- df_long %>%
  mutate(
    Rat_num = as.numeric(gsub("[^0-9]", "", Rat)),  # Extract number
    Rat = fct_reorder(Rat, Rat_num)                 # Reorder by extracted number
  )

# Now plot, using 'row' as the x-axis
ggplot(df_long, aes(x = factor(row), y = Value, fill = Rat)) +
  geom_bar(stat = "identity", position = "dodge") +
  theme_minimal() +
  labs(
    title = "Bar Chart of Rat Measurements by Row",
    x = "Time of Measurement",
    y = "Value"
  ) +
  scale_fill_viridis_d()
```




```
ggplot(df_long, aes(x = Rat, y = Value, fill = factor(row))) +
  geom_bar(stat = "identity", position = "dodge") +
  theme_minimal() +
  labs(
    title = "Rat weights",
    x = "Rat",
    y = "Value",
    fill = "Time of Measurement"
  ) +
  scale_fill_viridis_d()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```


```
#2 Regression for each rat
df <- rat
df$row <- seq_len(nrow(df))

# Pivot all rat columns (everything except 'row' and 'age')
df_long <- pivot_longer(df, cols = -c(row, age), names_to = "Rat", values_to = "Value")

model <- list()  # initialize an empty list to store models
for (rat in unique(df_long$Rat)) {
  model[[as.character(rat)]] <- lm(Value ~ age, data = df_long[df_long$Rat == rat, ])
}
# Extract coefficients and store in a data frame
coefficients <- do.call(rbind, lapply(model, function(m) {
  data.frame(
    Intercept = coef(m)[1],
    Slope = coef(m)[2]
  )
}))

model_summary <- lapply(names(model), function(rat) {
  m <- summary(model[[rat]])
  coef_val <- m$coefficients["age", "Estimate"]
  p_val <- m$coefficients["age", "Pr(>|t|)"]
  r_sq <- m$r.squared

  data.frame(
```

```
    Rat = rat,
    Coefficient = coef_val,
    P_value = p_val,
    R_squared = r_sq
  )
})

# Combine into a single data frame
model_summary_df <- do.call(rbind, model_summary)

# View result
print(model_summary_df)
```

```
##      Rat Coefficient      P_value R_squared
## 1   rat1    6.028571 1.233207e-04 0.9956169
## 2   rat2    7.314286 4.359822e-05 0.9978076
## 3   rat3    6.571429 2.999158e-03 0.9634473
## 4   rat4    5.085714 4.315639e-04 0.9899085
## 5   rat5    6.685714 1.978579e-05 0.9987050
## 6   rat6    6.171429 1.357228e-04 0.9953280
## 7   rat7    5.914286 1.800278e-04 0.9943609
## 8   rat8    6.485714 1.057902e-05 0.9991468
## 9   rat9    7.171429 1.866251e-04 0.9942241
## 10 rat10    5.742857 5.766308e-05 0.9973585
## 11 rat11    6.985714 5.146851e-05 0.9975512
## 12 rat12    6.100000 1.143182e-04 0.9958327
## 13 rat13    6.157143 3.185453e-05 0.9982213
## 14 rat14    6.842857 1.895757e-04 0.9941635
## 15 rat15    5.185714 5.488228e-04 0.9881588
## 16 rat16    5.842857 4.782635e-05 0.9976681
## 17 rat17    6.300000 4.052986e-05 0.9979116
## 18 rat18    5.742857 7.451959e-05 0.9968664
## 19 rat19    6.471429 4.337183e-04 0.9898750
## 20 rat20    6.014286 1.503645e-04 0.9949981
## 21 rat21    6.471429 1.064986e-04 0.9960248
## 22 rat22    5.757143 1.253909e-04 0.9955680
## 23 rat23    5.614286 1.051030e-04 0.9960596
## 24 rat24    5.800000 2.784024e-04 0.9924618
## 25 rat25    7.128571 1.488317e-05 0.9989289
## 26 rat26    6.657143 1.149595e-05 0.9990982
## 27 rat27    5.814286 1.207373e-04 0.9956783
## 28 rat28    5.742857 3.738562e-04 0.9908277
## 29 rat29    5.514286 3.901890e-05 0.9979638
## 30 rat30    6.114286 2.640752e-05 0.9984303
```

```
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model_summary <- lapply(names(model), function(rat) {
  m <- summary(model[[rat]])
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  r_sq <- m$r.squared

  data.frame(
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