edit: Mai Tuan Anh output: pdf_document: default html_document: df_print: paged —

```
# Load necessary libraries
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
# Read the CSV file into a dataframe
chicago_schools <- read.csv("C:/Users/Admin/Documents/Zalo Received Files/ChicagoPublicSchools.csv")
```

1. List the top 5 schools with the highest graduation rates

```
top_graduation_schools <- chicago_schools %>%
  arrange(desc(Graduation_Rate__)) # Sort by 'Graduation_Rate__' in descending order

top_5_schools <- head(top_graduation_schools, 5) # Take the top 5 schools
top_5_schools
```

```
##   School_ID                                                NAME_OF_SCHOOL
## 1    610038                                Abraham Lincoln Elementary School
## 2    610281 Adam Clayton Powell Paideia Community Academy Elementary School
## 3    610185                              Adlai E Stevenson Elementary School
## 4    609993                                  Agustin Lara Elementary Academy
## 5    610513                                    Air Force Academy High School
##   Elementary..Middle..or.High.School        Street_Address    City State
## 1                                 ES       615 W Kemper Pl Chicago    IL
## 2                                 ES 7511 S South Shore Dr Chicago    IL
## 3                                 ES    8010 S Kostner Ave Chicago    IL
## 4                                 ES    4619 S Wolcott Ave Chicago    IL
## 5                                 HS       3630 S Wells St Chicago    IL
##   ZIP_Code   Phone_Number
## 1    60614 (773) 534-5720
## 2    60649 (773) 535-6650
## 3    60652 (773) 535-2280
## 4    60609 (773) 535-4389
## 5    60609 (773) 535-1590
##                                                                                Link
## 1 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_610038.pdf
## 2 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_610281.pdf
## 3 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_610185.pdf
```

```
## 4 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_609993.pdf
## 5 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_610513.pdf
##                     Network_Manager                 Collaborative_Name
## 1       Fullerton Elementary Network NORTH-NORTHWEST SIDE COLLABORATIVE
## 2          Skyway Elementary Network           SOUTH SIDE COLLABORATIVE
## 3          Midway Elementary Network       SOUTHWEST SIDE COLLABORATIVE
## 4        Pershing Elementary Network       SOUTHWEST SIDE COLLABORATIVE
## 5 Southwest Side High School Network       SOUTHWEST SIDE COLLABORATIVE
##   Adequate_Yearly_Progress_Made_ Track_Schedule CPS_Performance_Policy_Status
## 1                             No       Standard              Not on Probation
## 2                             No        Track_E              Not on Probation
## 3                             No       Standard              Not on Probation
## 4                             No        Track_E              Not on Probation
## 5                            NDA       Standard              Not on Probation
##   CPS_Performance_Policy_Level HEALTHY_SCHOOL_CERTIFIED Safety_Icon
## 1                      Level 1                      Yes Very Strong
## 2                      Level 1                       No     Average
## 3                      Level 2                       No      Strong
## 4                      Level 1                       No     Average
## 5                Not Enough Data                      Yes     Average
##   SAFETY_SCORE Family_Involvement_Icon Family_Involvement_Score
## 1           99             Very Strong                      99
## 2           54                  Strong                      66
## 3           61                     NDA                     NDA
## 4           56                 Average                      44
## 5           49                  Strong                      60
##   Environment_Icon Environment_Score Instruction_Icon Instruction_Score
## 1           Strong                74           Strong                66
## 2           Strong                74      Very Strong                84
## 3          Average                50             Weak                36
## 4          Average                45             Weak                37
## 5           Strong                60          Average                55
##   Leaders_Icon Leaders_Score Teachers_Icon Teachers_Score
## 1         Weak            65        Strong             70
## 2         Weak            63        Strong             76
## 3         Weak           NDA           NDA            NDA
## 4         Weak            65       Average             48
## 5         Weak            45       Average             54
##   Parent_Engagement_Icon Parent_Engagement_Score Parent_Environment_Icon
## 1                 Strong                      56                Average
## 2                   Weak                      46                Average
## 3                Average                      47                   Weak
## 4                Average                      53                 Strong
## 5                Average                      53                Average
##   Parent_Environment_Score AVERAGE_STUDENT_ATTENDANCE
## 1                       47                     96.00%
## 2                       50                     95.60%
## 3                       41                     95.70%
## 4                       58                     95.50%
## 5                       49                     93.30%
##   Rate_of_Misconducts__per_100_students_ Average_Teacher_Attendance
## 1                                    2.0                     96.40%
## 2                                   15.7                     95.30%
## 3                                    2.3                     94.70%
```

```
## 4                                  10.4                    95.80%
## 5                                  15.6                    96.90%
##   Individualized_Education_Program_Compliance_Rate Pk_2_Literacy__ Pk_2_Math__
## 1                                          95.80%            80.1        43.3
## 2                                         100.00%            62.4        51.7
## 3                                          98.30%            53.7        26.6
## 4                                         100.00%            76.9         NDA
## 5                                         100.00%             NDA         NDA
##   Gr3_5_Grade_Level_Math__ Gr3_5_Grade_Level_Read__ Gr3_5_Keep_Pace_Read__
## 1                     89.6                     84.9                   60.7
## 2                     21.9                     15.1                     29
## 3                     38.3                     34.7                   43.7
## 4                       26                     24.7                   61.8
## 5                      NDA                      NDA                    NDA
##   Gr3_5_Keep_Pace_Math__ Gr6_8_Grade_Level_Math__ Gr6_8_Grade_Level_Read__
## 1                   62.6                     81.9                     85.2
## 2                   42.8                     38.5                     27.4
## 3                   57.3                     48.8                     39.2
## 4                   49.7                     39.2                     27.2
## 5                    NDA                      NDA                      NDA
##   Gr6_8_Keep_Pace_Math_ Gr6_8_Keep_Pace_Read__ Gr_8_Explore_Math__
## 1                    52                  62.4                66.3
## 2                  44.8                  42.7                14.1
## 3                  46.8                    44                 7.5
## 4                  69.7                  60.6                 9.1
## 5                   NDA                   NDA                 NDA
##   Gr_8_Explore_Read__ ISAT_Exceeding_Math__ ISAT_Exceeding_Reading__
## 1                77.9                  69.7                     64.4
## 2                34.4                  16.8                     16.5
## 3                21.9                  18.3                     15.5
## 4                18.2                  11.1                      9.6
## 5                 NDA                    NA                       NA
##   ISAT_Value_Add_Math ISAT_Value_Add_Read ISAT_Value_Add_Color_Math
## 1                 0.2                 0.9                    Yellow
## 2                 0.7                 1.4                     Green
## 3                -0.9                -1.0                       Red
## 4                 0.9                 2.4                     Green
## 5                  NA                  NA                       NDA
##   ISAT_Value_Add_Color_Read Students_Taking__Algebra__
## 1                     Green                      67.1
## 2                     Green                      17.2
## 3                       Red                       NDA
## 4                     Green                      42.9
## 5                       NDA                       NDA
##   Students_Passing__Algebra__ X9th.Grade.EXPLORE..2009.
## 1                        54.5                       NDA
## 2                        27.3                       NDA
## 3                         NDA                       NDA
## 4                          25                       NDA
## 5                         NDA                      14.6
##   X9th.Grade.EXPLORE..2010. X10th.Grade.PLAN..2009. X10th.Grade.PLAN..2010.
## 1                       NDA                     NDA                      NDA
## 2                       NDA                     NDA                      NDA
## 3                       NDA                     NDA                      NDA
```

```
## 4                       NDA                     NDA                     NDA
## 5                      14.8                     NDA                      16
##   Net_Change_EXPLORE_and_PLAN X11th.Grade.Average.ACT..2011.
## 1                         NDA                            NDA
## 2                         NDA                            NDA
## 3                         NDA                            NDA
## 4                         NDA                            NDA
## 5                         1.4                            NDA
##   Net_Change_PLAN_and_ACT College_Eligibility__ Graduation_Rate__
## 1                     NDA                   NDA               NDA
## 2                     NDA                   NDA               NDA
## 3                     NDA                   NDA               NDA
## 4                     NDA                   NDA               NDA
## 5                     NDA                   NDA               NDA
##   College_Enrollment_Rate__ COLLEGE_ENROLLMENT General_Services_Route
## 1                       NDA                813                     33
## 2                       NDA                521                     46
## 3                       NDA               1324                     44
## 4                       NDA                556                     42
## 5                       NDA                302                     40
##   Freshman_on_Track_Rate__ X_COORDINATE Y_COORDINATE Latitude Longitude
## 1                      NDA      1171699      1915829 41.92450 -87.64452
## 2                      NDA      1196130      1856209 41.76032 -87.55674
## 3                      NDA      1148427      1851012 41.74711 -87.73170
## 4                      NDA      1164504      1873959 41.80976 -87.67214
## 5                     91.8      1175178      1880745 41.82815 -87.63279
##   COMMUNITY_AREA_NUMBER COMMUNITY_AREA_NAME Ward Police_District
## 1                     7        LINCOLN PARK   43              18
## 2                    43         SOUTH SHORE    7               4
## 3                    70             ASHBURN   13               8
## 4                    61            NEW CITY   20               9
## 5                    34       ARMOUR SQUARE   11               9
##                      Location
## 1 (41.92449696, -87.64452163)
## 2 (41.76032435, -87.55673627)
## 3 (41.74711093, -87.73170248)
## 4   (41.8097569, -87.6721446)
## 5 (41.82814609, -87.63279369)
```

2. Calculate the average safety score for each school type

```
average_safety_scores <- chicago_schools %>%
  group_by("Elementary, Middle, or High School") %>%  # Group by school type
  summarise(Average_Safety_Score = mean(SAFETY_SCORE, na.rm = TRUE))  # Calculate the average safety sc
average_safety_scores
```

```
## # A tibble: 1 x 2
##   `"Elementary, Middle, or High School"` Average_Safety_Score
##   <chr>                                           <dbl>
## 1 Elementary, Middle, or High School               49.5
```

3. Count the number of "Healthy School" certified schools

```
healthy_school_count <- chicago_schools %>%
  filter(HEALTHY_SCHOOL_CERTIFIED == "Yes") %>%  # Filter schools with "Yes" in Healthy_School
  count()  # Count the number of such schools
healthy_school_count
```

```
##    n
## 1 16
```

4. Find the school with the highest percentage of students taking Algebra

```
highest_algebra_participation <- chicago_schools %>%
  filter(!is.na(Students_Taking__Algebra__)) %>%  # Remove rows with missing Algebra participation valu
  arrange(desc(Students_Taking__Algebra__)) %>%  # Sort by Algebra participation percentage
  slice(1)  # Get the school with the highest Algebra participation
highest_algebra_participation
```

```
##   School_ID                      NAME_OF_SCHOOL
## 1    610185 Adlai E Stevenson Elementary School
##   Elementary..Middle..or.High.School     Street_Address    City State ZIP_Code
## 1                                ES 8010 S Kostner Ave Chicago    IL    60652
##     Phone_Number
## 1 (773) 535-2280
##                                                                              Link
## 1 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_610185.pdf
##             Network_Manager           Collaborative_Name
## 1 Midway Elementary Network SOUTHWEST SIDE COLLABORATIVE
##   Adequate_Yearly_Progress_Made_ Track_Schedule CPS_Performance_Policy_Status
## 1                             No       Standard              Not on Probation
##   CPS_Performance_Policy_Level HEALTHY_SCHOOL_CERTIFIED Safety_Icon
## 1                      Level 2                       No      Strong
##   SAFETY_SCORE Family_Involvement_Icon Family_Involvement_Score
## 1           61                    NDA                      NDA
##   Environment_Icon Environment_Score Instruction_Icon Instruction_Score
## 1          Average                50             Weak                36
##   Leaders_Icon Leaders_Score Teachers_Icon Teachers_Score
## 1         Weak           NDA           NDA            NDA
##   Parent_Engagement_Icon Parent_Engagement_Score Parent_Environment_Icon
## 1                Average                      47                    Weak
##   Parent_Environment_Score AVERAGE_STUDENT_ATTENDANCE
## 1                       41                     95.70%
##   Rate_of_Misconducts__per_100_students_ Average_Teacher_Attendance
## 1                                    2.3                     94.70%
##   Individualized_Education_Program_Compliance_Rate Pk_2_Literacy__ Pk_2_Math__
## 1                                           98.30%            53.7        26.6
##   Gr3_5_Grade_Level_Math__ Gr3_5_Grade_Level_Read__ Gr3_5_Keep_Pace_Read__
```

```
## 1                     38.3                     34.7                     43.7
##   Gr3_5_Keep_Pace_Math__ Gr6_8_Grade_Level_Math__ Gr6_8_Grade_Level_Read__
## 1                   57.3                     48.8                     39.2
##   Gr6_8_Keep_Pace_Math_ Gr6_8_Keep_Pace_Read__ Gr_8_Explore_Math__
## 1                  46.8                    44                 7.5
##   Gr_8_Explore_Read__ ISAT_Exceeding_Math__ ISAT_Exceeding_Reading__
## 1                21.9                  18.3                     15.5
##   ISAT_Value_Add_Math ISAT_Value_Add_Read ISAT_Value_Add_Color_Math
## 1                -0.9                  -1                       Red
##   ISAT_Value_Add_Color_Read Students_Taking__Algebra__
## 1                       Red                        NDA
##   Students_Passing__Algebra__ X9th.Grade.EXPLORE..2009.
## 1                         NDA                       NDA
##   X9th.Grade.EXPLORE..2010. X10th.Grade.PLAN..2009. X10th.Grade.PLAN..2010.
## 1                       NDA                     NDA                      NDA
##   Net_Change_EXPLORE_and_PLAN X11th.Grade.Average.ACT..2011.
## 1                         NDA                            NDA
##   Net_Change_PLAN_and_ACT College_Eligibility__ Graduation_Rate__
## 1                     NDA                   NDA               NDA
##   College_Enrollment_Rate__ COLLEGE_ENROLLMENT General_Services_Route
## 1                       NDA               1324                     44
##   Freshman_on_Track_Rate__ X_COORDINATE Y_COORDINATE Latitude Longitude
## 1                      NDA      1148427      1851012 41.74711  -87.7317
##   COMMUNITY_AREA_NUMBER COMMUNITY_AREA_NAME Ward Police_District
## 1                    70             ASHBURN   13               8
##                       Location
## 1 (41.74711093, -87.73170248)
```

5. Calculate the average ACT score for high schools

```r
# Assuming your data frame is called chicago_schools

# Convert the column to character type
chicago_schools$X11th.Grade.Average.ACT..2011. <- as.character(chicago_schools$X11th.Grade.Average.ACT.

# Replace "NDA" with NA
chicago_schools$X11th.Grade.Average.ACT..2011.[chicago_schools$X11th.Grade.Average.ACT..2011. == "NDA"]

# Convert the column to numeric
chicago_schools$X11th.Grade.Average.ACT..2011. <- as.numeric(chicago_schools$X11th.Grade.Average.ACT..2

# Calculate the mean, ignoring NA values
mean_value <- mean(chicago_schools$X11th.Grade.Average.ACT..2011., na.rm = TRUE)

# Print the result
print(mean_value)
```

```
## [1] 16.8012
```

6. Count the number of schools in each community area

```
schools_per_community <- chicago_schools %>%
  group_by(COMMUNITY_AREA_NAME) %>%  # Group by community area
  summarise(School_Count = n())  # Count the number of schools
schools_per_community
```

```
## # A tibble: 77 x 2
##    COMMUNITY_AREA_NAME School_Count
##    <chr>                      <int>
##  1 ALBANY PARK                    8
##  2 ARCHER HEIGHTS                 2
##  3 ARMOUR SQUARE                  3
##  4 ASHBURN                        8
##  5 AUBURN GRESHAM                10
##  6 AUSTIN                        23
##  7 AVALON PARK                    3
##  8 AVONDALE                       4
##  9 BELMONT CRAGIN                12
## 10 BEVERLY                        4
## # i 67 more rows
```

7. Identify the school with the highest college enrollment rate

```
highest_college_enrollment <- chicago_schools %>%
  filter(!is.na(COLLEGE_ENROLLMENT)) %>%  # Remove rows with missing college enrollment rate
  arrange(desc(COLLEGE_ENROLLMENT)) %>%  # Sort by college enrollment rate
  slice(1)  # Get the school with the highest college enrollment
highest_college_enrollment
```

```
##   School_ID                      NAME_OF_SCHOOL
## 1    609720 Albert G Lane Technical High School
##   Elementary..Middle..or.High.School    Street_Address    City State ZIP_Code
## 1                                HS 2501 W Addison St Chicago    IL    60618
##     Phone_Number
## 1 (773) 534-5400
##                                                                          Link
## 1 http://schoolreports.cps.edu/SchoolProgressReport_Eng/Spring2011Eng_609720.pdf
##                            Network_Manager                 Collaborative_Name
## 1 North-Northwest Side High School Network NORTH-NORTHWEST SIDE COLLABORATIVE
##   Adequate_Yearly_Progress_Made_ Track_Schedule CPS_Performance_Policy_Status
## 1                            Yes       Standard              Not on Probation
##   CPS_Performance_Policy_Level HEALTHY_SCHOOL_CERTIFIED Safety_Icon
## 1                      Level 1                       No Very Strong
##   SAFETY_SCORE Family_Involvement_Icon Family_Involvement_Score
## 1           88                    NDA                      NDA
##   Environment_Icon Environment_Score Instruction_Icon Instruction_Score
## 1           Strong                62          Average                52
##   Leaders_Icon Leaders_Score Teachers_Icon Teachers_Score
```

```
## 1         Weak           NDA           NDA            NDA
##   Parent_Engagement_Icon Parent_Engagement_Score Parent_Environment_Icon
## 1                    NDA                     NDA                      NDA
##   Parent_Environment_Score AVERAGE_STUDENT_ATTENDANCE
## 1                      NDA                     96.30%
##   Rate_of_Misconducts__per_100_students_ Average_Teacher_Attendance
## 1                                    2.1                     96.20%
##   Individualized_Education_Program_Compliance_Rate Pk_2_Literacy__ Pk_2_Math__
## 1                                           99.40%             NDA         NDA
##   Gr3_5_Grade_Level_Math__ Gr3_5_Grade_Level_Read__ Gr3_5_Keep_Pace_Read__
## 1                      NDA                      NDA                    NDA
##   Gr3_5_Keep_Pace_Math__ Gr6_8_Grade_Level_Math__ Gr6_8_Grade_Level_Read__
## 1                    NDA                      NDA                      NDA
##   Gr6_8_Keep_Pace_Math_ Gr6_8_Keep_Pace_Read__ Gr_8_Explore_Math__
## 1                   NDA                    NDA                 NDA
##   Gr_8_Explore_Read__ ISAT_Exceeding_Math__ ISAT_Exceeding_Reading__
## 1                 NDA                   NA                       NA
##   ISAT_Value_Add_Math ISAT_Value_Add_Read ISAT_Value_Add_Color_Math
## 1                  NA                  NA                      NDA
##   ISAT_Value_Add_Color_Read Students_Taking__Algebra__
## 1                       NDA                       NDA
##   Students_Passing__Algebra__ X9th.Grade.EXPLORE..2009.
## 1                         NDA                      19.1
##   X9th.Grade.EXPLORE..2010. X10th.Grade.PLAN..2009. X10th.Grade.PLAN..2010.
## 1                      19.5                    19.9                     20.1
##   Net_Change_EXPLORE_and_PLAN X11th.Grade.Average.ACT..2011.
## 1                           1                           23.4
##   Net_Change_PLAN_and_ACT College_Eligibility__ Graduation_Rate__
## 1                     3.5                  67.9              92.2
##   College_Enrollment_Rate__ COLLEGE_ENROLLMENT General_Services_Route
## 1                      79.8               4368                     35
##   Freshman_on_Track_Rate__ X_COORDINATE Y_COORDINATE Latitude Longitude
## 1                     90.7      1158975      1923792 41.94662 -87.69106
##   COMMUNITY_AREA_NUMBER COMMUNITY_AREA_NAME Ward Police_District
## 1                     5        NORTH CENTER   47              19
##                     Location
## 1 (41.94661693, -87.69105603)
```

8. Calculate the average environment score for each Network Manager

```
average_environment_score <- chicago_schools %>%
  group_by(Network_Manager) %>%  # Group by Network Manager
  summarise(Average_Environment_Score = mean(Environment_Score, na.rm = TRUE))  # Calculate the average
average_environment_score
```

```
## # A tibble: 20 x 2
##    Network_Manager                          Average_Environment_Score
##    <chr>                                                        <dbl>
##  1 AUSL Schools                                                  55.1
```

```
##  2 Austin-North Lawndale Elementary Network                    51.9
##  3 Burnham Park Elementary Network                             41.7
##  4 Englewood-Gresham Elementary Network                        45.3
##  5 Far South Side High School Network                          37.8
##  6 Fullerton Elementary Network                                49.3
##  7 Fulton Elementary Network                                   49.9
##  8 Garfield-Humboldt Elementary Network                        50
##  9 Lake Calumet Elementary Network                             42.9
## 10 Midway Elementary Network                                   43.5
## 11 North-Northwest Side High School Network                    50.0
## 12 O'Hare Elementary Network                                   52.2
## 13 Pershing Elementary Network                                 45.7
## 14 Pilsen-Little Village Elementary Network                    46.4
## 15 Ravenswood-Ridge Elementary Network                         55.9
## 16 Rock Island Elementary Network                              44.7
## 17 Skyway Elementary Network                                   48.0
## 18 South Side High School Network                              37.9
## 19 Southwest Side High School Network                          40.4
## 20 West Side High School Network                               51
```

9. Count schools achieving "Level 1" in CPS Performance Policy

```
level_1_count <- chicago_schools %>%
  filter(CPS_Performance_Policy_Level == "Level 1") %>%  # Filter schools with "Level 1"
  count()  # Count the number of such schools
level_1_count
```

```
##     n
## 1 139
```

10. Calculate total college enrollment by community area

```
college_enrollment_by_community <- chicago_schools %>%
  filter(!is.na(COLLEGE_ENROLLMENT)) %>%  # Filter rows with valid College Enrollment data
  group_by(COMMUNITY_AREA_NAME) %>%  # Group by community area
  summarise(Total_College_Enrollment = sum(COLLEGE_ENROLLMENT, na.rm = TRUE))  # Calculate total colleg
college_enrollment_by_community
```

```
## # A tibble: 77 x 2
##    COMMUNITY_AREA_NAME Total_College_Enrollment
##    <chr>                                 <int>
##  1 ALBANY PARK                            6864
##  2 ARCHER HEIGHTS                         4823
##  3 ARMOUR SQUARE                          1458
##  4 ASHBURN                                6483
##  5 AUBURN GRESHAM                         4175
##  6 AUSTIN                                10933
##  7 AVALON PARK                            1522
```

```
##  8 AVONDALE                          3640
##  9 BELMONT CRAGIN                   14386
## 10 BEVERLY                           1636
## # i 67 more rows
```