Sardar Patel Institute of Technology,Mumbai
Department of Electronics and Telecommunication Engineering
B.E. Sem-VII (2022-2023) Data Analytics

**Experiment: Exploratory Data Analysis (EDA)**

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**Aim:** Perform Exploratory Data Analysis (EDA) on SAS

**Dataset Overview**

The dataset 'SASHELP.BASEBALL' contains 24 columns with 322 rows containing the information of each baseball player from different countries of the world in his career. :

Code :

```
data first;
set SASHELP.BASEBALL;
run;
proc means data= SASHELP.BASEBALL mean median mode std var min max;
run;

proc means data= SASHELP.BASEBALL nmiss;
run;

proc print =SASHELP.BASEBALL;
where Div = "NW";
run;

proc sql;
select count(distinct Div) as Div,
       count(distinct Team) as Team,
       count(distinct CrHits) as CrHits
  from SASHELP.BASEBALL;
quit;

proc freq data=SASHELP.BASEBALL;
   tables Team;    /* _ALL_ is the defaul */
run;

data nHits;
set SASHELP.BASEBALL(keep=_NUMERIC_            /* all numeric variables */
                    ); /* two character variables */
run;

proc print data= nHits(obs=5);
run;
```

```
  from SASHELP.BASEBALL;
quit;

proc freq data=SASHELP.BASEBALL;
   tables Team;    /* _ALL_ is the defaul */
run;

data nHits;
set SASHELP.BASEBALL(keep=_NUMERIC_            /* all numeric variables */
                 ); /* two character variables */
run;

proc print data= nHits(obs=5);
run;

proc means data=nHits nmiss;
run;

ods graphics / reset width=6.4in height=4.8in imagemap;
proc sgplot data=SASHELP.BASEBALL;
vbox  nAtBat / category=nHome;
yaxis grid;
run;
ods graphics / reset;

proc ttest data = SASHELP.BASEBALL SIDES=L;
class nAtBat;
var nHits;
run;
```

Output :

The MEANS Procedure

| Variable | Label | Mean | Median | Mode | Std Dev | Variance | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| nAtBat | Times at Bat in 1986 | 390.0745342 | 390.5000000 | 209.0000000 | 143.5958352 | 20619.76 | 127.0000000 | 687.0000000 |
| nHits | Hits in 1986 | 103.3975155 | 98.5000000 | 53.0000000 | 44.1795091 | 1951.83 | 31.0000000 | 238.0000000 |
| nHome | Home Runs in 1986 | 11.1024845 | 8.5000000 | 4.0000000 | 8.6987696 | 75.6685919 | 0 | 40.0000000 |
| nRuns | Runs in 1986 | 52.2173913 | 48.0000000 | 42.0000000 | 25.0573661 | 627.8715969 | 12.0000000 | 130.0000000 |
| nRBI | RBIs in 1986 | 49.3726708 | 45.0000000 | 29.0000000 | 25.5011624 | 650.3092819 | 8.0000000 | 121.0000000 |
| nBB | Walks in 1986 | 39.8571429 | 35.5000000 | 22.0000000 | 21.0959408 | 445.0387183 | 3.0000000 | 105.0000000 |
| YrMajor | Years in the Major Leagues | 7.6801242 | 6.0000000 | 4.0000000 | 4.9697066 | 24.6979838 | 1.0000000 | 24.0000000 |
| CrAtBat | Career Times at Bat | 2763.08 | 2065.00 | 216.0000000 | 2328.48 | 5421815.23 | 166.0000000 | 14053.00 |
| CrHits | Career Hits | 747.6863354 | 552.0000000 | 160.0000000 | 654.7876194 | 428746.83 | 34.0000000 | 4256.00 |
| CrHome | Career Home Runs | 74.0900621 | 40.0000000 | 16.0000000 | 90.0651268 | 8111.73 | 0 | 548.0000000 |
| CrRuns | Career Runs | 374.2857143 | 266.0000000 | 20.0000000 | 336.4250377 | 113181.81 | 18.0000000 | 2165.00 |
| CrRbi | Career RBIs | 347.6149068 | 250.0000000 | 32.0000000 | 338.7903452 | 114778.90 | 9.0000000 | 1659.00 |
| CrBB | Career Walks | 273.3944099 | 178.5000000 | 55.0000000 | 273.6253716 | 74870.84 | 8.0000000 | 1566.00 |
| nOuts | Put Outs in 1986 | 288.9937888 | 212.0000000 | 0 | 280.6566732 | 78768.17 | 0 | 1378.00 |
| nAssts | Assists in 1986 | 106.9161491 | 39.5000000 | 0 | 136.8524541 | 18728.59 | 0 | 492.0000000 |
| nError | Errors in 1986 | 8.0403727 | 6.0000000 | 3.0000000 | 6.3683591 | 40.5559974 | 0 | 32.0000000 |
| Salary | 1987 Salary in $ Thousands | 535.9258821 | 425.0000000 | 750.0000000 | 451.1186807 | 203508.06 | 67.5000000 | 2460.00 |
| logSalary | Log Salary | 5.9272215 | 6.0520892 | 6.6200732 | 0.8891924 | 0.7906631 | 4.2121276 | 7.8079166 |

The MEANS Procedure

| Variable | Label | N Miss |
|---|---|---|
| nAtBat | Times at Bat in 1986 | 0 |
| nHits | Hits in 1986 | 0 |
| nHome | Home Runs in 1986 | 0 |
| nRuns | Runs in 1986 | 0 |
| nRBI | RBIs in 1986 | 0 |
| nBB | Walks in 1986 | 0 |
| YrMajor | Years in the Major Leagues | 0 |
| CrAtBat | Career Times at Bat | 0 |
| CrHits | Career Hits | 0 |
| CrHome | Career Home Runs | 0 |
| CrRuns | Career Runs | 0 |
| CrRbi | Career RBIs | 0 |
| CrBB | Career Walks | 0 |
| nOuts | Put Outs in 1986 | 0 |
| nAssts | Assists in 1986 | 0 |
| nError | Errors in 1986 | 0 |
| Salary | 1987 Salary in $ Thousands | 59 |
| logSalary | Log Salary | 59 |

| Div | Team | CrHits |
|---|---|---|
| 4 | 24 | 267 |

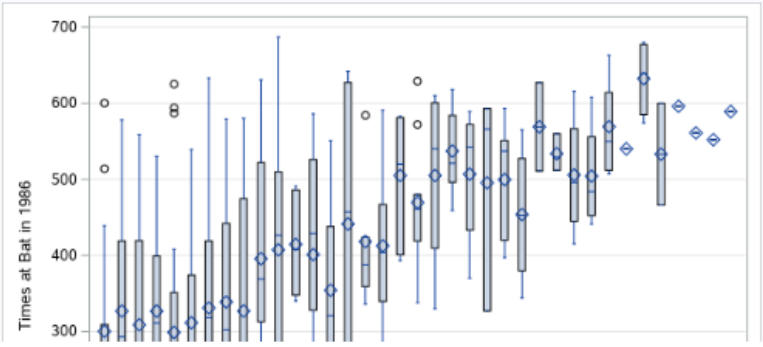
The FREQ Procedure

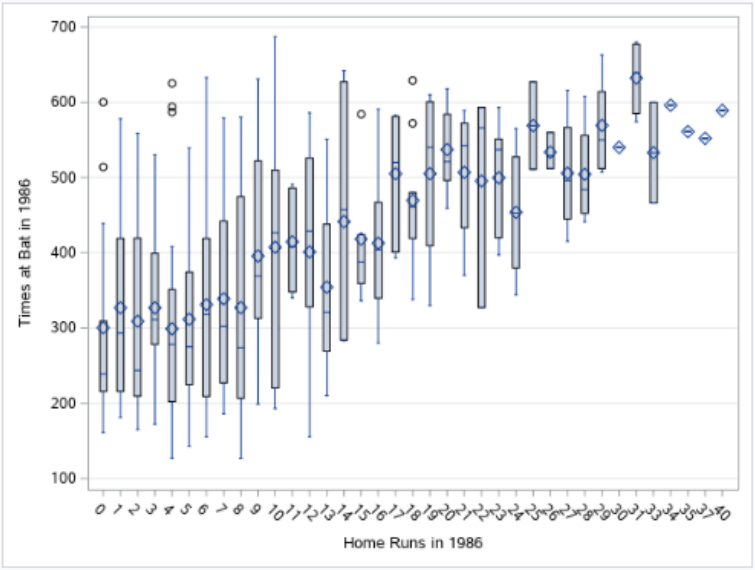
| Team at the End of 1986 | | | | |
|---|---|---|---|---|
| Team | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| Atlanta | 11 | 3.42 | 11 | 3.42 |
| Baltimore | 15 | 4.66 | 26 | 8.07 |
| Boston | 10 | 3.11 | 36 | 11.18 |
| California | 13 | 4.04 | 49 | 15.22 |
| Chicago | 24 | 7.45 | 73 | 22.67 |
| Cincinnati | 12 | 3.73 | 85 | 26.40 |
| Cleveland | 12 | 3.73 | 97 | 30.12 |
| Detroit | 12 | 3.73 | 109 | 33.85 |
| Houston | 11 | 3.42 | 120 | 37.27 |
| Kansas City | 14 | 4.35 | 134 | 41.61 |
| Los Angeles | 14 | 4.35 | 148 | 45.96 |
| Milwaukee | 14 | 4.35 | 162 | 50.31 |
| Minneapolis | 13 | 4.04 | 175 | 54.35 |
| Montreal | 14 | 4.35 | 189 | 58.70 |
| New York | 24 | 7.45 | 213 | 66.15 |
| Oakland | 12 | 3.73 | 225 | 69.88 |
| Philadelphia | 12 | 3.73 | 237 | 73.60 |
| Pittsburgh | 11 | 3.42 | 248 | 77.02 |
| San Diego | 13 | 4.04 | 261 | 81.06 |
| San Francisco | 14 | 4.35 | 275 | 85.40 |
| Seattle | 12 | 3.73 | 287 | 89.13 |
| California | 13 | 4.04 | 49 | 15.22 |
| Chicago | 24 | 7.45 | 73 | 22.67 |
| Cincinnati | 12 | 3.73 | 85 | 26.40 |
| Cleveland | 12 | 3.73 | 97 | 30.12 |
| Detroit | 12 | 3.73 | 109 | 33.85 |
| Houston | 11 | 3.42 | 120 | 37.27 |
| Kansas City | 14 | 4.35 | 134 | 41.61 |
| Los Angeles | 14 | 4.35 | 148 | 45.96 |
| Milwaukee | 14 | 4.35 | 162 | 50.31 |
| Minneapolis | 13 | 4.04 | 175 | 54.35 |
| Montreal | 14 | 4.35 | 189 | 58.70 |
| New York | 24 | 7.45 | 213 | 66.15 |
| Oakland | 12 | 3.73 | 225 | 69.88 |
| Philadelphia | 12 | 3.73 | 237 | 73.60 |
| Pittsburgh | 11 | 3.42 | 248 | 77.02 |
| San Diego | 13 | 4.04 | 261 | 81.06 |
| San Francisco | 14 | 4.35 | 275 | 85.40 |
| Seattle | 12 | 3.73 | 287 | 89.13 |
| St Louis | 11 | 3.42 | 298 | 92.55 |
| Texas | 13 | 4.04 | 311 | 96.58 |
| Toronto | 11 | 3.42 | 322 | 100.00 |

| Obs | nAtBat | nHits | nHome | nRuns | nRBI | nBB | YrMajor | CrAtBat | CrHits | CrHome | CrRuns | CrRbi | CrBB | nOuts | nAssts | nError | Salary | logSalary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 293 | 66 | 1 | 30 | 29 | 14 | 1 | 293 | 66 | 1 | 30 | 29 | 14 | 446 | 33 | 20 | . | . |
| 2 | 315 | 81 | 7 | 24 | 38 | 39 | 14 | 3449 | 835 | 69 | 321 | 414 | 375 | 632 | 43 | 10 | 475.0 | 6.16331 |
| 3 | 479 | 130 | 18 | 66 | 72 | 76 | 3 | 1624 | 457 | 63 | 224 | 266 | 263 | 880 | 82 | 14 | 480.0 | 6.17379 |
| 4 | 496 | 141 | 20 | 65 | 78 | 37 | 11 | 5628 | 1575 | 225 | 828 | 838 | 354 | 200 | 11 | 3 | 500.0 | 6.21461 |
| 5 | 321 | 87 | 10 | 39 | 42 | 30 | 2 | 396 | 101 | 12 | 48 | 46 | 33 | 805 | 40 | 4 | 91.5 | 4.51634 |

The MEANS Procedure

| Variable | Label | N Miss |
|---|---|---|
| nAtBat | Times at Bat in 1986 | 0 |
| nHits | Hits in 1986 | 0 |
| nHome | Home Runs in 1986 | 0 |
| nRuns | Runs in 1986 | 0 |
| nRBI | RBIs in 1986 | 0 |
| nBB | Walks in 1986 | 0 |
| YrMajor | Years in the Major Leagues | 0 |
| CrAtBat | Career Times at Bat | 0 |
| CrHits | Career Hits | 0 |
| CrHome | Career Home Runs | 0 |
| CrRuns | Career Runs | 0 |
| CrRbi | Career RBIs | 0 |
| CrBB | Career Walks | 0 |
| nOuts | Put Outs in 1986 | 0 |
| nAssts | Assists in 1986 | 0 |
| nError | Errors in 1986 | 0 |
| Salary | 1987 Salary in $ Thousands | 59 |
| logSalary | Log Salary | 59 |



**Conclusion:**

1. Performed EDA on SAS Studio for baseball dataset.
2. Exploratory Data Analysis refers to the critical process of performing critical investigations on data so as to discover patterns or to spot anomalities.
3. Few insights we found from the dataset:
    - Variance is the highest for career RBI's for each baseball player.
    - It is noted that players of Philadelphia team has the highest cumulative frequency for the attributes in the dataset.
    - From the graph we can see that the times a player has batted in the baseball game is the highest for 10 home runs in the year 1986 for the dataset.
    - The teams at the end of 1986 with the largest frequency is for New York and Chicago