Jul 31 2025 BDBP106: Linux and Python programming :- Lab 4

Learning goals: Linux OS commands ln, file, cat, more, less, head, tail, history and sort
NOTE: Save screenshots of each exercise, and upload your work to your github account as Lab4.pdf by end of Thursday Jul 31.
For this lab, download 'Heart.csv' to a folder called 'Lab4'. If the file download to the "Downloads" folder by default, move the file to the folder 'Lab4'.
EXERCISES Start a fresh terminal for this Lab.

(1) Create symbolic and hard links to the data file you downloaded. What happens if you use the same name for the links? Print the screenshot of the output message and paste it in your answers. Also how do you prove that you have created the links correctly? Use the appropriate command to prove it.

```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ls
Heart.csv
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ln -s Heart.csv Heart_slink
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ln Heart.csv Heart_hlink
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ln Heart.csv Heart_slink
ln: failed to create hard link 'Heart_slink': File exists
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ls -li
total 40
9044004 -rw-rw-r-- 2 ibab ibab 19925 Jul 31 13:59 Heart.csv
9044004 -rw-rw-r-- 2 ibab ibab 19925 Jul 31 13:59 Heart_hlink
9044417 lrwxrwxrwx 1 ibab ibab     9 Jul 31 14:45 Heart_slink -> Heart.csv
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$
```

ANS:- (Snap No.1)

A)We cannot creat the Symbolic link & hard link using same name in Same Directory:- Output message :-

failed to create symbolic link 'Heart_Nlink': File exists

B) ls -li command gives list of details with i note number thus we can visualise the i-node no of Symbiolic link & Hard link the Heart_hlink has same i-node as of Heart.csv(original file) but file Heart_slink having different i-note number thus it proves it is a soft link

(2) What command will you use to determine the filetype of the downloaded data file?Execute this command and take a screenshot of the command and the output to paste it in your work.

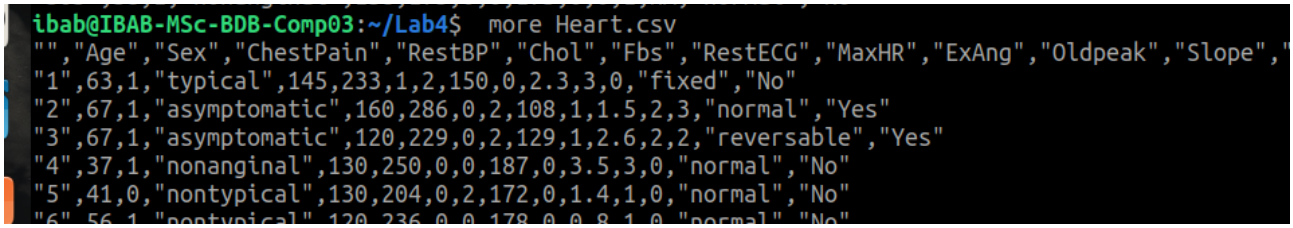
```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ file Heart.csv
Heart.csv: CSV text
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$
```

(Snap No.2)

Ans:- To Determine the filetype of the downloaded data file the file Command is used ex file <File Name>

Output:- Heart.csv: CSV text

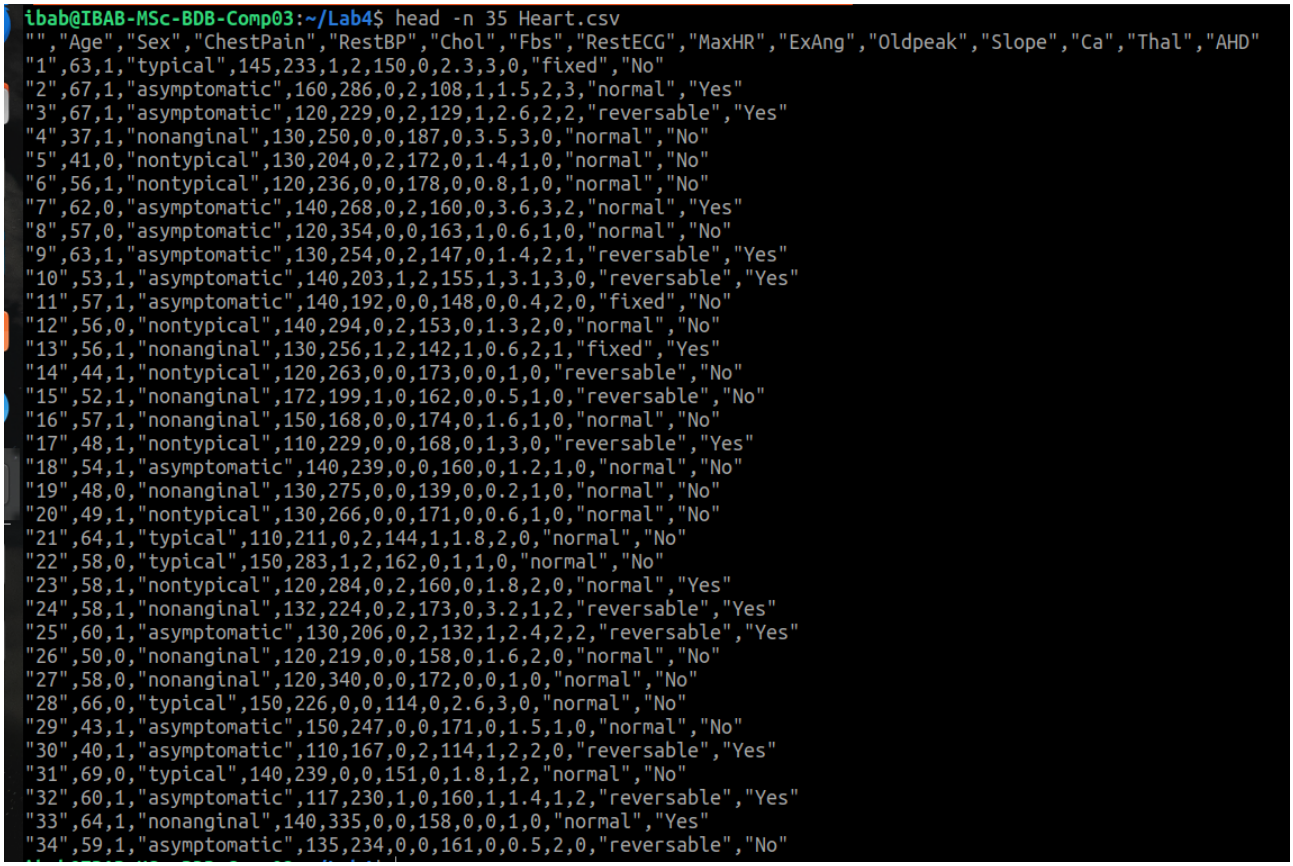
(3) View the contents of the data file using more and less commands. How many pages are there?



(Snap No.3)

Ans:- By Using more & less command Its found to be file name Heart.csv contain total 9 page evaluvated through using space bar.

(4) Output the first 35 lines of the data file using the appropriate command. Save the screenshot in your work.



(Snap No.4)

Ans:- head command gives first 10 lines of a file by adding -n 35 gives desired length of lines required -n stands for number then the apropriate Command will be :- head -n 35 Heart.csv

(5) Output the last 15 lines of the data file using the appropriate command. Save the screenshot in your work.

```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ tail -n15 Heart.csv
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes"
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes"
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes"
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
```

(Snap No.5)

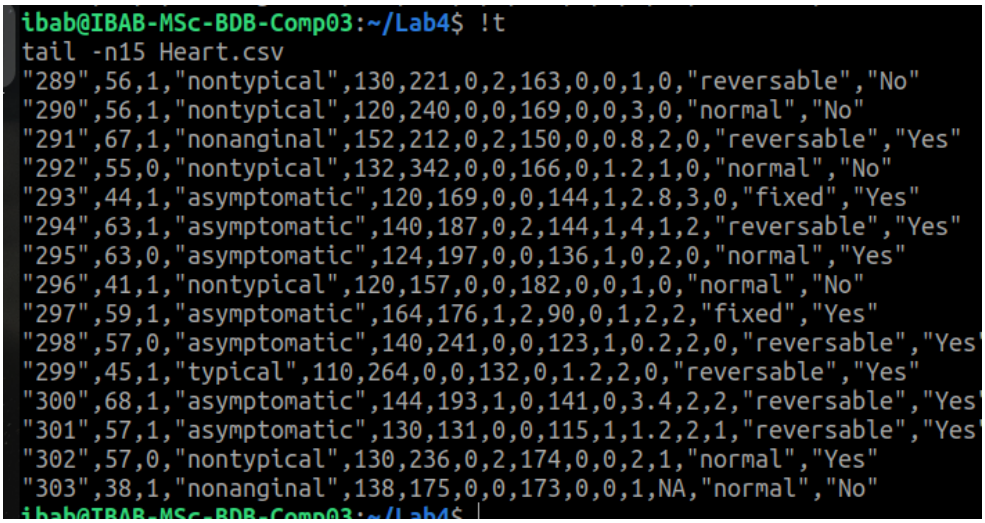
Ans:- tail command gives last 10 lines of a file by adding -n 15 gives desired length of lines required -n stands for number then the apropriate Command will be :- tail -n 15 Heart.csv

(6) Use the history command to list the last few commands, and execute the second lastcommand in your list. Do this using both the process ID and the first letter of the command.

```
  472  more Heart.csv
  473  less Heart.csv
  474  more less Heart.csv
  475  head -n 35 Heart.csv
  476  head -nr 12 Heart.csv
  477  head -n -r Heart.csv
  478  tail -n15 Heart.csv
  479  history
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$
```

(Snap No.5: history)

```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ !478
tail -n15 Heart.csv
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
```

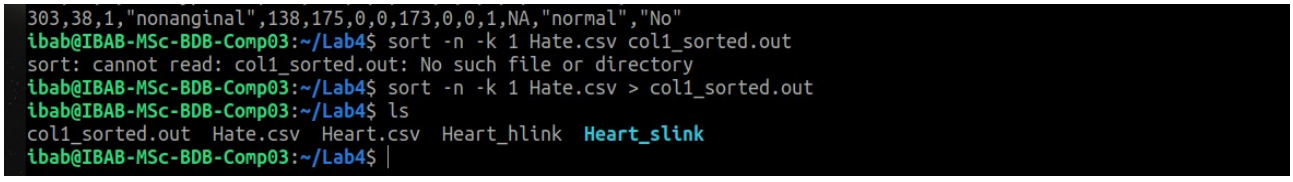


(Snap No.7)

(7) The sort command. For each of the exercises below, find the correct combination of options for the sort command using the man pages. Make sure to show your sequence of steps clearly in your submission work.

(i) Sort the data according to the first column, keeping in mind that the first column has numbers. Save the output in a new file called col1_sorted.out.

(Snap No.8)



(Snap No.9)

Ans:-1) sort -n -k 1 Hate.csv > col1_sorted.out

2) sort -n -k 1 Hate.csv -o col1_sorted.out (both can be used)

(ii) Sort the data according to the ‘Age’ column. Save the output in a new file called age_sorted.out.

```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ ls
col1_sorted.out  Hate.csv  Heart.csv  Heart_hlink  Heart_slink
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ sort -t ',' -k2 -n Hate.csv -o age_sorted.out
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ more age_sorted.out
0,"Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Thal","AHD"
133,29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
226,34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
102,34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
118,35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
139,35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
169,35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
```

(Snap No.10)

ANS;- command :- sort -t ',' -k2 -n Hate.csv -o age_sorted.out

(iii) Sort the data in a reverse manner according to the ’RestBP’ column. Save the output in a new file called restbp_revsort.out.

```
ibab@IBAB-MSc-BDB-Comp03:~$ cd Lab4
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ cat restbp_revsort.out
127,56,0,"asymptomatic",200,288,1,2,133,1,4,3,2,"reversable","Yes"
189,54,1,"nontypical",192,283,0,2,195,0,0,1,1,"reversable","Yes"
202,64,0,"asymptomatic",180,325,0,0,154,1,0,1,0,"normal","No"
214,66,0,"asymptomatic",178,228,1,0,165,1,1,2,2,"reversable","Yes"
173,59,0,"asymptomatic",174,249,0,0,143,1,0,2,0,"normal","Yes"
147,57,1,"asymptomatic",165,289,1,2,124,0,1,2,3,"reversable","Yes"
200,59,1,"typical",160,273,0,2,125,0,0,1,0,"normal","Yes"
188,66,1,"nontypical",160,246,0,0,120,1,0,2,3,"fixed","Yes"
235,54,0,"nonanginal",160,201,0,0,163,0,0,1,1,"normal","No"
185,60,0,"asymptomatic",158,305,0,2,161,0,0,1,0,"normal","Yes"
```

(Snap No.11)

```
"127",56,0,"asymptomatic",200,288,1,2,133,1,4,3,2,"reversable","Yes"
"189",54,1,"nontypical",192,283,0,2,195,0,0,1,1,"reversable","Yes"
"84",68,1,"nonanginal",180,274,1,2,150,1,1.6,2,0,"reversable","Yes"
"232",55,0,"asymptomatic",180,327,0,1,117,1,3.4,2,0,"normal","Yes"
"202",64,0,"asymptomatic",180,325,0,0,154,1,0,1,0,"normal","No"
"214",66,0,"asymptomatic",178,228,1,0,165,1,1,2,2,"reversable","Yes"
"184",59,1,"typical",178,270,0,2,145,0,4.2,3,0,"reversable","No"
"173",59,0,"asymptomatic",174,249,0,0,143,1,0,2,0,"normal","Yes"
"15",52,1,"nonanginal",172,199,1,0,162,0,0.5,1,0,"reversable","No"
"69",59,1,"asymptomatic",170,326,0,2,140,1,3.4,3,0,"reversable","Yes"
"287",58,0,"asymptomatic",170,225,1,2,146,1,2.8,2,2,"fixed","Yes"
"276",64,1,"typical",170,227,0,2,155,0,0.6,2,0,"reversable","No"
```

(Snap No.12 GNU)

Ans:- command :sort -t ',' --key=5,5 -n -r Heart.csv > test.out GNU

command :sort -t ',' -k 5 -n Heart.csv > test.out Unix

(iv) Repeat (ii) and (iii) by giving GNU-style parameters to the sort command. This is where man pages are extremely useful!

A)

```
ibab@IBAB-MSc-BDB-Comp03:~$ cd Lab4
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ sort --field-separator=',' --key=2 --numeric-sort  --reverse Heart.csv --output=age
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ cat age3_sortedgnu.out
"162",77,1,"asymptomatic",125,304,0,2,162,1,0,1,3,"normal","Yes"
"258",76,0,"nonanginal",140,197,0,1,116,0,1.1,2,0,"normal","No"
"234",74,0,"nontypical",120,269,0,2,121,1,0.2,1,1,"normal","No"
"43",71,0,"nontypical",160,302,0,0,162,0,0.4,1,2,"normal","No"
"274",71,0,"asymptomatic",112,149,0,0,125,0,1.6,2,0,"normal","No"
"104",71,0,"nonanginal",110,265,1,2,130,0,0,1,1,"normal","No"
"259",70,1,"nontypical",156,245,0,2,143,0,0,1,0,"normal","No"
"171",70,1,"nonanginal",160,269,0,0,112,1,2.9,2,1,"reversable","Yes"
"156",70,1,"asymptomatic",130,322,0,2,109,0,2.4,2,3,"normal","Yes"
```

(Snap No.13 GNU)

ANS:-sort --field-separator=',' --key=2 --numeric-sort --reverse Heart.csv --output=age3_sortedgnu.out

```
bab@IBAB-MSc-BDB-Comp03:~/Lab4$
bab@IBAB-MSc-BDB-Comp03:~/Lab4$ sort --field-separator=',' --key=5 --numeric-sort  --reverse Heart.csv --output=restb
bab@IBAB-MSc-BDB-Comp03:~/Lab4$ cat restbp_revsort.out
27,56,0,"asymptomatic",200,288,1,2,133,1,4,3,2,"reversable","Yes"
89,54,1,"nontypical",192,283,0,2,195,0,0,1,1,"reversable","Yes"
02,64,0,"asymptomatic",180,325,0,0,154,1,0,1,0,"normal","No"
14,66,0,"asymptomatic",178,228,1,0,165,1,1,2,2,"reversable","Yes"
73,59,0,"asymptomatic",174,249,0,0,143,1,0,2,0,"normal","Yes"
47,57,1,"asymptomatic",165,289,1,2,124,0,1,2,3,"reversable","Yes"
00,59,1,"typical",160,273,0,2,125,0,0,1,0,"normal","Yes"
88,66,1,"nontypical",160,246,0,0,120,1,0,2,3,"fixed","Yes"
35,54,0,"nonanginal",160,201,0,0,163,0,0,1,1,"normal","No"
85,60,0,"asymptomatic",158,305,0,2,161,0,0,1,0,"normal","Yes"
```

(Snap No.14 GNU)

ANS:-sort --field-separator=',' --key=5 --numeric-sort --reverse Heart.csv --output=restbp1_revsort.out

(v) Sort the data first according to age, and then according to RestBP. How would you do this? Explain the steps clearly.

```
162,77,1,"asymptomatic",125,304,0,2,162,1,0,1,3,"normal","Yes"
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ sort -t ',' -k2 -n -k5 -n Hate.csv
0,"Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Thal","AHD"
133,29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
226,34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
102,34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
118,35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
139,35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
284,35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
169,35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
211,37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
4,37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
212,38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
```

(Snap No.15)

Ans- sort -t ',' -k2 -n -k5 -n Hate.csv sort= sorting, -t=--field-separator, -k=--key, -n

It frist sorts according to age & then Within same age group sort accroding to the Rest BP

(vi) Sort the data according to sex, then according to age, then according to ChestPain. Explain the steps clearly.

```
ibab@IBAB-MSc-BDB-Comp03:~/Lab4$ sort -t ',' -k2 -n -k5 -n -k4 -s Hate.csv
0,"Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Thal","AHD"
133,29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
226,34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
102,34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
118,35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
139,35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
284,35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
169,35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
211,37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
4,37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
212,38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
303,38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
```

(Snap No.16)

Ans- sort -t ',' -k2 -n -k5 -n -k4 -s Hate.csv