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(https://www.darshan.ac.in/)

Data Mining

Lab - 3

1) First, you need to read the titanic dataset from local disk and display first five records

In [2]:
```
import pandas as pd
```

In [5]:
```
df=pd.read_csv("titanic.csv")
```

In [6]:
```
df.head(5)
```

Out[6]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [ ]:

2) Identify Nominal, Ordinal, Binary and Numeric attributes from data sets and display all values.

In [ ]:
```
numeric=["PassengerId","Age","SibSp","Parch","Fare",]
Nominal=["Name","Ticket","Cabin","Embarked"]
Ordinal=["Pclass"]
Binary=["Survived","Sex"]
```

In [12]:
```
df["PassengerId"].unique()
```

Out[12]:
```
array([  1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12,  13,
        14,  15,  16,  17,  18,  19,  20,  21,  22,  23,  24,  25,  26,
        27,  28,  29,  30,  31,  32,  33,  34,  35,  36,  37,  38,  39,
        40,  41,  42,  43,  44,  45,  46,  47,  48,  49,  50,  51,  52,
        53,  54,  55,  56,  57,  58,  59,  60,  61,  62,  63,  64,  65,
        66,  67,  68,  69,  70,  71,  72,  73,  74,  75,  76,  77,  78,
        79,  80,  81,  82,  83,  84,  85,  86,  87,  88,  89,  90,  91,
        92,  93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103, 104,
       105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117,
       118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130,
       131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143,
       144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156,
       157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169,
       170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182,
       183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195,
       196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208,
       209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221,
       222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234,
       235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247,
       248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260,
       261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273,
       274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286,
       287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299,
       300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312,
       313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325,
       326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338,
       339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351,
       352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364,
       365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377,
       378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390,
       391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403,
       404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416,
       417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429,
       430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442,
       443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455,
       456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468,
       469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481,
       482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494,
       495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507,
       508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520,
       521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533,
       534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546,
       547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559,
       560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572,
       573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585,
       586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598,
       599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611,
       612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624,
       625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637,
       638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650,
       651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663,
       664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676,
       677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689,
       690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702,
       703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715,
       716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728,
       729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741,
       742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754,
       755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767,
       768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780,
       781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793,
       794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806,
       807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819,
       820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832,
       833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845,
       846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858,
       859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871,
       872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884,
       885, 886, 887, 888, 889, 890, 891], dtype=int64)
```

In [15]:
```
df["Survived"].unique()
```

Out[15]:
```
array([0, 1], dtype=int64)
```

In [16]:
```
df["Pclass"].unique()
```

Out[16]:
```
array([3, 1, 2], dtype=int64)
```

In [17]:
```
df["Parch"].unique()
```

Out[17]:
```
array([0, 1, 2, 5, 3, 4, 6], dtype=int64)
```

In [18]:
```
df["Embarked"].unique()
```

Out[18]:
```
array(['S', 'C', 'Q', nan], dtype=object)
```

In [19]:
```
df["SibSp"].unique()
```

Out[19]:
```
array([1, 0, 3, 4, 2, 5, 8], dtype=int64)
```

3) Identify symmetric and asymmetric binary attributes from data sets and display all values.

In [ ]:

In [ ]:

In [ ]:
```
symmetric=["Sex"]
asymmetric=["Survived"]
```

4) For each quantitative attribute, calculate its average, standard deviation, minimum, mode, range and maximum values.

In [43]:
```
quantitative = ["PassengerId","Survived","Pclass","Age","SibSp","Parch","Fare"]
for i in quantitative :
    print(    )
    print(i)

    print("\tmean",df[i].mean())
    print("\tstandard deviation",df[i].std())
    print("\tminimum",df[i].min())
    print("\tmaximum",df[i].max())
    print("\tmode",df[i].mode()[0])
    print("\trange",df[i].max()-df[i].min())
```

```
PassengerId
        mean 446.0
        standard deviation 257.3538420152301
        minimum 1
        maximum 891
        mode 1
        range 890

Survived
        mean 0.3838383838383838
        standard deviation 0.4865924542648585
        minimum 0
        maximum 1
        mode 0
        range 1

Pclass
        mean 2.308641975308642
        standard deviation 0.8360712409770513
        minimum 1
        maximum 3
        mode 3
        range 2

Age
        mean 29.69911764705882
        standard deviation 14.526497332334044
        minimum 0.42
        maximum 80.0
        mode 24.0
        range 79.58

SibSp
        mean 0.5230078563411896
        standard deviation 1.1027434322934275
        minimum 0
        maximum 8
        mode 0
        range 8

Parch
        mean 0.38159371492704824
        standard deviation 0.8060572211299559
        minimum 0
        maximum 6
        mode 0
        range 6

Fare
        mean 32.204207968574636
        standard deviation 49.693428597180905
        minimum 0.0
        maximum 512.3292
        mode 8.05
        range 512.3292
```

6) For the qualitative attribute (class), count the frequency for each of its distinct values.

In [41]:
```
df["Pclass"].value_counts()
```

Out[41]:
```
3    491
1    216
2    184
Name: Pclass, dtype: int64
```

7) It is also possible to display the summary for all the attributes simultaneously in a table using the describe() function. If an attribute is quantitative, it will display its mean, standard deviation and various quantiles (including minimum, median, and maximum) values. If an attribute is qualitative, it will display its number of unique values and the top (most frequent) values.

In [48]:
```
print(df.describe(include="all"))
```

```
        PassengerId    Survived      Pclass                     Name   Sex  \
count    891.000000  891.000000  891.000000                      891   891
unique          NaN         NaN         NaN                      891     2
top             NaN         NaN         NaN  Braund, Mr. Owen Harris  male
freq            NaN         NaN         NaN                        1   577
mean     446.000000    0.383838    2.308642                      NaN   NaN
std      257.353842    0.486592    0.836071                      NaN   NaN
min        1.000000    0.000000    1.000000                      NaN   NaN
25%      223.500000    0.000000    2.000000                      NaN   NaN
50%      446.000000    0.000000    3.000000                      NaN   NaN
75%      668.500000    1.000000    3.000000                      NaN   NaN
max      891.000000    1.000000    3.000000                      NaN   NaN

               Age       SibSp       Parch  Ticket        Fare    Cabin  \
count   714.000000  891.000000  891.000000     891  891.000000      204
unique         NaN         NaN         NaN     681         NaN      147
top            NaN         NaN         NaN  347082         NaN  B96 B98
freq           NaN         NaN         NaN       7         NaN        4
mean     29.699118    0.523008    0.381594     NaN   32.204208      NaN
std      14.526497    1.102743    0.806057     NaN   49.693429      NaN
min       0.420000    0.000000    0.000000     NaN    0.000000      NaN
25%      20.125000    0.000000    0.000000     NaN    7.910400      NaN
50%      28.000000    0.000000    0.000000     NaN   14.454200      NaN
75%      38.000000    1.000000    0.000000     NaN   31.000000      NaN
max      80.000000    8.000000    6.000000     NaN  512.329200      NaN

       Embarked
count       889
unique        3
top           S
freq        644
mean        NaN
std         NaN
min         NaN
25%         NaN
50%         NaN
75%         NaN
max         NaN
```

In [49]:
```
df.describe()
```

Out[49]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [50]:
```
df.describe(include = "object")
```

Out[50]:

	Name	Sex	Ticket	Cabin	Embarked
count	891	891	891	204	889
unique	891	2	681	147	3
top	Braund, Mr. Owen Harris	male	347082	B96 B98	S
freq	1	577	7	4	644

8) For multivariate statistics, you can compute the covariance and correlation between pairs of attributes.

In [54]:
```
df.corr()
```

```
C:\Users\student\AppData\Local\Temp\ipykernel_2196\1134722465.py:1: FutureWarning: The default value of n
umeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only v
alid columns or specify the value of numeric_only to silence this warning.
  df.corr()
```

Out[54]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

In [55]:
```
df.cov()
```

```
C:\Users\student\AppData\Local\Temp\ipykernel_2196\1545644723.py:1: FutureWarning: The default value of n
umeric_only in DataFrame.cov is deprecated. In a future version, it will default to False. Select only va
lid columns or specify the value of numeric_only to silence this warning.
  df.cov()
```

Out[55]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	66231.000000	-0.626966	-7.561798	138.696504	-16.325843	-0.342697	161.883369
Survived	-0.626966	0.236772	-0.137703	-0.551296	-0.018954	0.032017	6.221787
Pclass	-7.561798	-0.137703	0.699015	-4.496004	0.076599	0.012429	-22.830196
Age	138.696504	-0.551296	-4.496004	211.019125	-4.163334	-2.344191	73.849030
SibSp	-16.325843	-0.018954	0.076599	-4.163334	1.216043	0.368739	8.748734
Parch	-0.342697	0.032017	0.012429	-2.344191	0.368739	0.649728	8.661052
Fare	161.883369	6.221787	-22.830196	73.849030	8.748734	8.661052	2469.436846

In [11]:
```

```

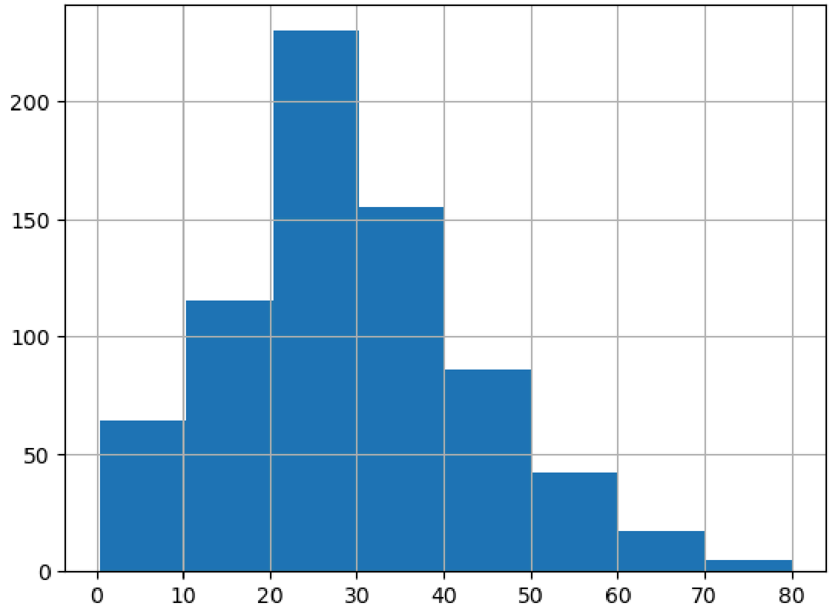
Out[11]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

9) Display the histogram for Age attribute by discretizing it into 8 separate bins and counting the frequency for each bin.

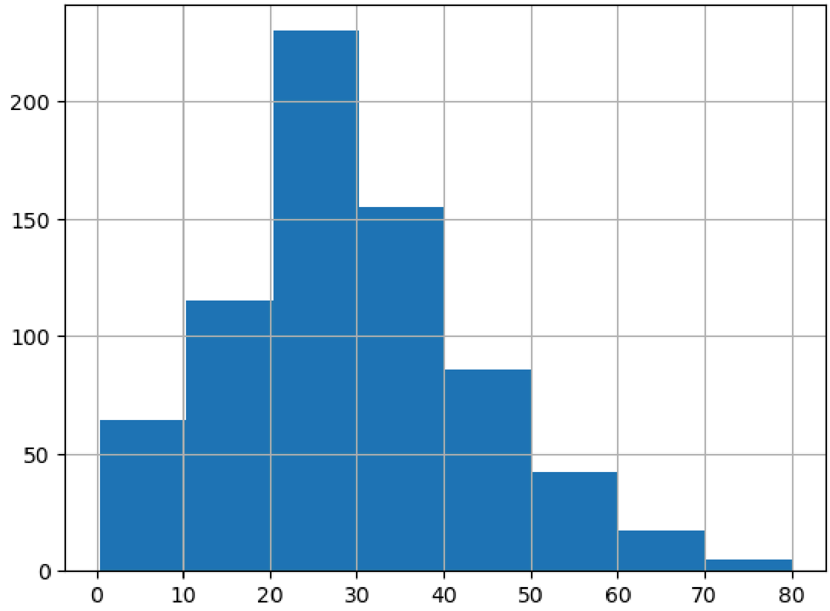
In [60]:
```
import matplotlib.pyplot as plt
```

In [64]:
```
plt.hist(df["Age"],bins =8)
plt.grid()
```



In [74]:
```
df["Age"].hist(bins=8)
```

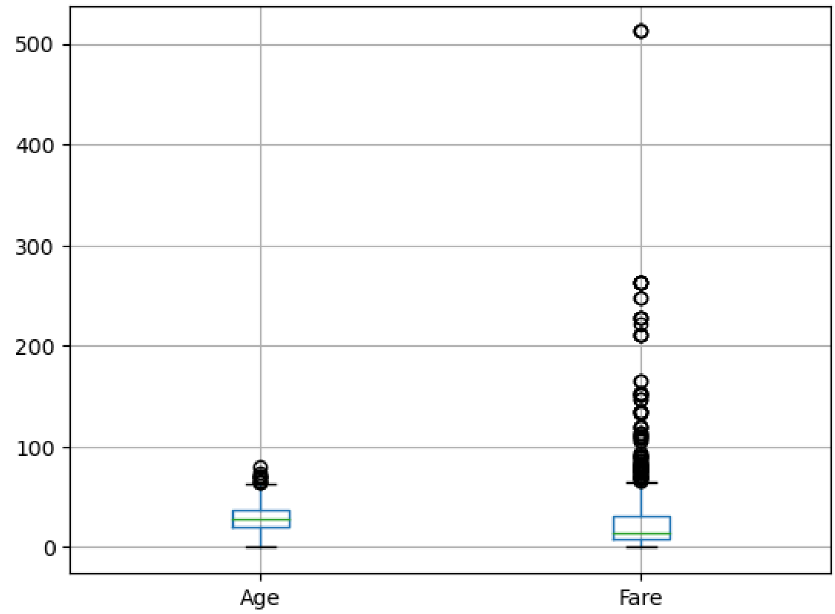
Out[74]: <Axes: >



10) A boxplot can also be used to show the distribution of values for each attribute.

In [73]:
```
df.boxplot(["Age","Fare"])
```

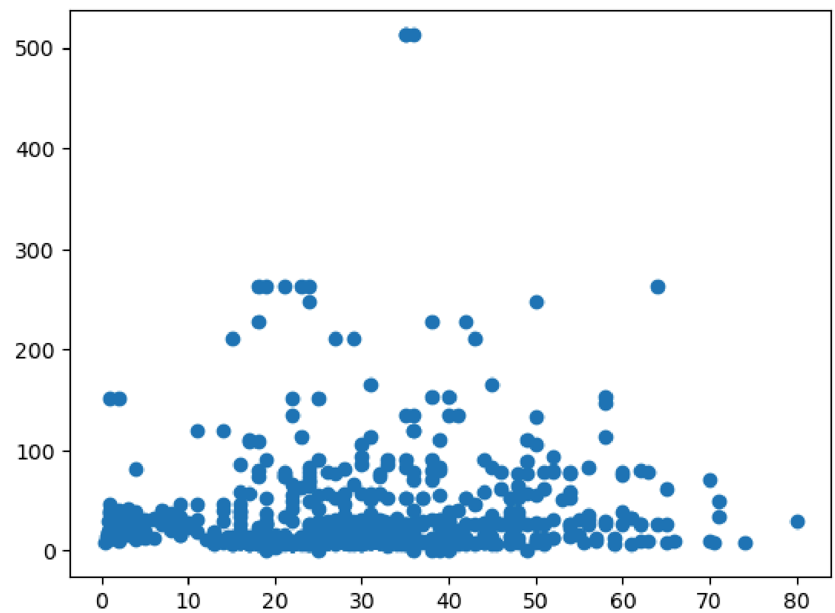
Out[73]: <Axes: >



11) Display scatter plot for any 5 pair of attributes , we can use a scatter plot to visualize their joint distribution.

In [75]:
```
#onepare
plt.scatter(df["Age"],df["Fare"])
```

Out[75]: <matplotlib.collections.PathCollection at 0x1ae13ad9840>



In [ ]:

In [ ]: