**PRACTICAL: 1**

*Presentation of bi-variate data through scatter-plot diagram and calculations of covariance.*

**FORMULA USED:**

1. **VARIANCE :**

Hence, we can write it as,

1. **COVARIANCE :**

**Question:** Collect data of random people and draw inferences about the correlation between the two observed data and study the relationship between the two variables.

**Answer:** We recorded the age and salary of 100 people selected at random. The observations were as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AGE | SALARY(in thousands) | X^2 | Y^2 | XY |
| 21 | 25 | 441 | 625 | 525 |
| 34 | 45 | 1156 | 2025 | 1530 |
| 45 | 43 | 2025 | 1849 | 1935 |
| 32 | 32 | 1024 | 1024 | 1024 |
| 33 | 65 | 1089 | 4225 | 2145 |
| 45 | 32 | 2025 | 1024 | 1440 |
| 45 | 65 | 2025 | 4225 | 2925 |
| 55 | 32 | 3025 | 1024 | 1760 |
| 65 | 32 | 4225 | 1024 | 2080 |
| 58 | 50 | 3364 | 2500 | 2900 |
| 25 | 22.5 | 625 | 506.25 | 562.5 |
| 26 | 27 | 676 | 729 | 702 |
| 24 | 26.8 | 576 | 718.24 | 643.2 |
| 34 | 32 | 1156 | 1024 | 1088 |
| 25 | 24 | 625 | 576 | 600 |
| 22 | 25 | 484 | 625 | 550 |
| 21 | 24 | 441 | 576 | 504 |
| 27 | 28 | 729 | 784 | 756 |
| 29 | 29.7 | 841 | 882.09 | 861.3 |
| 23 | 24.7 | 529 | 610.09 | 568.1 |
| 32 | 32 | 1024 | 1024 | 1024 |
| 23 | 23 | 529 | 529 | 529 |
| 32 | 34 | 1024 | 1156 | 1088 |
| 22 | 32 | 484 | 1024 | 704 |
| 32 | 34 | 1024 | 1156 | 1088 |
| 56 | 34 | 3136 | 1156 | 1904 |
| 67 | 34 | 4489 | 1156 | 2278 |
| 68 | 54 | 4624 | 2916 | 3672 |
| 64 | 54 | 4096 | 2916 | 3456 |
| 63 | 54 | 3969 | 2916 | 3402 |
| 35 | 54 | 1225 | 2916 | 1890 |
| 34 | 40.7 | 1156 | 1656.49 | 1383.8 |
| 24 | 65 | 576 | 4225 | 1560 |
| 33 | 34 | 1089 | 1156 | 1122 |
| 25 | 23.7 | 625 | 561.69 | 592.5 |
| 28 | 24 | 784 | 576 | 672 |
| 29 | 35 | 841 | 1225 | 1015 |
| 30 | 43 | 900 | 1849 | 1290 |
| 31 | 32 | 961 | 1024 | 992 |
| 25 | 43 | 625 | 1849 | 1075 |
| 40 | 45 | 1600 | 2025 | 1800 |
| 39 | 46.8 | 1521 | 2190.24 | 1825.2 |
| 35 | 58.2 | 1225 | 3387.24 | 2037 |
| 44 | 45 | 1936 | 2025 | 1980 |
| 21 | 27.9 | 441 | 778.41 | 585.9 |
| 24 | 30.5 | 576 | 930.25 | 732 |
| 34 | 37 | 1156 | 1369 | 1258 |
| 24 | 43 | 576 | 1849 | 1032 |
| 56 | 68 | 3136 | 4624 | 3808 |
| 24 | 34 | 576 | 1156 | 816 |
| 43 | 34 | 1849 | 1156 | 1462 |
| 23 | 43 | 529 | 1849 | 989 |
| 34 | 43 | 1156 | 1849 | 1462 |
| 34 | 44 | 1156 | 1936 | 1496 |
| 67 | 54 | 4489 | 2916 | 3618 |
| 25 | 43 | 625 | 1849 | 1075 |
| 42 | 23 | 1764 | 529 | 966 |
| 25 | 43 | 625 | 1849 | 1075 |
| 45 | 34 | 2025 | 1156 | 1530 |
| 25 | 43 | 625 | 1849 | 1075 |
| 43 | 33 | 1849 | 1089 | 1419 |
| 44 | 46 | 1936 | 2116 | 2024 |
| 43 | 34 | 1849 | 1156 | 1462 |
| 28 | 43 | 784 | 1849 | 1204 |
| 43 | 29.5 | 1849 | 870.25 | 1268.5 |
| 21 | 32 | 441 | 1024 | 672 |
| 22 | 32 | 484 | 1024 | 704 |
| 23 | 34 | 529 | 1156 | 782 |
| 54 | 34 | 2916 | 1156 | 1836 |
| 32 | 43 | 1024 | 1849 | 1376 |
| 65 | 43 | 4225 | 1849 | 2795 |
| 65 | 43 | 4225 | 1849 | 2795 |
| 22 | 54 | 484 | 2916 | 1188 |
| 35 | 45 | 1225 | 2025 | 1575 |
| 36 | 43.6 | 1296 | 1900.96 | 1569.6 |
| 38 | 45.3 | 1444 | 2052.09 | 1721.4 |
| 45 | 59 | 2025 | 3481 | 2655 |
| 52 | 57 | 2704 | 3249 | 2964 |
| 52 | 32 | 2704 | 1024 | 1664 |
| 23 | 30.6 | 529 | 936.36 | 703.8 |
| 62 | 34 | 3844 | 1156 | 2108 |
| 33 | 43 | 1089 | 1849 | 1419 |
| 57 | 56 | 3249 | 3136 | 3192 |
| 52 | 57.89 | 2704 | 3351.252 | 3010.28 |
| 34 | 54 | 1156 | 2916 | 1836 |
| 65 | 60 | 4225 | 3600 | 3900 |
| 46 | 45 | 2116 | 2025 | 2070 |
| 54 | 53.56 | 2916 | 2868.674 | 2892.24 |
| 51 | 46 | 2601 | 2116 | 2346 |
| 53 | 56.6 | 2809 | 3203.56 | 2999.8 |
| 34 | 60 | 1156 | 3600 | 2040 |
| 54 | 45 | 2916 | 2025 | 2430 |
| 54 | 47 | 2916 | 2209 | 2538 |
| 68 | 65.6 | 4624 | 4303.36 | 4460.8 |
| 60 | 60 | 3600 | 3600 | 3600 |
| 63 | 60 | 3969 | 3600 | 3780 |
| 21 | 25 | 441 | 625 | 525 |
| 23 | 23.4 | 529 | 547.56 | 538.2 |
| 25 | 25 | 625 | 625 | 625 |
| 27 | 32 | 729 | 1024 | 864 |
| 3868 | 4065.55 | 170584 | 179787.1 | 166011.1 |

**GRAPH:**

1. SCATTER-PLOT GRAPH

**CALCULATIONS:**

|  |  |
| --- | --- |
| **MEAN(X)=** | **38.68** |
| **MEAN(Y)=** | **40.6555** |
|  |  |
| **VAR(X)=** | **209.6976** |
| **VAR(Y)=** | **145.0008768** |
| **COV(X,Y)=** | **87.55646** |
|  |  |
| **SD(X)=** | **14.4809392** |
| **SD(Y)=** | **12.04163098** |
|  |  |
| **R=** | **0.502118416** |

**INFERENCE:**

It can be seen that the age and salary of some people increase simultaneously. While some of the people remain static on what they started earning on some point of time. We can say that age and salary has an average positive correlation.