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1 % NAME: ADITYA BARMAN
2 % ROLL: 002320601024
3 % PROBLEM 8. Correlation with Frequency
4
5
6 clc, clearvars, close all
7
8 n = 100;
9 f_vals = [0 0 0 2 4 4
10 0 0 1 4 6 5
11 0 0 5 10 8 1
12 1 4 9 5 2 0
13 3 6 6 2 0 0
14 3 5 4 0 0 0];
15
16 % initializing upper and lower bounds for x & y
17 up_bd_xy = [99 89 79 69 59 49];
18 lw_bd_xy = [90 80 70 60 50 40];
19
20 % initialiazng midpts and assumed means (both same for x & y)
21 midpts_xy = (up_bd_xy + lw_bd_xy) / 2;
22 mean_asmd_xy = 74.5;
23 % obtaining factor from subtraction from assumed mean
24 diff_factor = 10;
25
26 % calculating u & v vals (same for u & v)
27 u_vals = zeros(1, 6);
28
29 for i = 1:6
30     u_vals(i) = ((midpts_xy(i) - mean_asmd_xy) / diff_factor);
31 end
32
33 v_vals = u_vals;
34
35 % initializing a 6x6 zero matrix to store fuv values
36 fuv = zeros(6, 6);
37 % following loop traverses through each cell and stores the required
value
38 for j = 1:6
39     for k = 1:6
40         fuv(j, k) = f_vals(j, k) * v_vals(j) * u_vals(k);
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41     end
42 end
43
44
45 % initializing required matrices
46 % for v
47 f_v = [10 16 24 21 17 12]; % given
48 fv = zeros(1, 6);
49 fv_sq = zeros(1, 6);
50 f_uv = 0;
51
52 %for u
53 f_u = [7 17 25 23 20 10]; % given
54 fu = zeros(1, 6);
55 fu_sq = zeros(1, 6);
56
57 % calculating fu, fv, fu^2, fv^2
58 for a = 1:6
59     fv(a) = f_v(a) .* v_vals(a);
60     fv_sq(a) = f_v(a) .* (v_vals(a)^2);
61     fu(a) = f_u(a) .* u_vals(a);
62     fu_sq(a) = f_u(a) .* (u_vals(a)^2);
63 end
64
65 % calculating f_uv
66 for m = 1:36
67     f_uv = f_uv + fuv(m);
68 end
69 % calculating respective sums
70 fv_sum = 0;
71 fv_sq_sum = 0;
72 fu_sum = 0;
73 fu_sq_sum = 0;
74
75 for d = 1:6
76     fv_sum =fv_sum + fv(d);
77     fv_sq_sum =fv_sq_sum + fv_sq(d);
78     fu_sum =fu_sum + fu(d);
79     fu_sq_sum =fu_sq_sum + fu_sq(d);
80 end
81
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82 % calculating square of summation of fu & fv respectively
83 fu_sum_sq = fu_sum ^ 2;
84 fv_sum_sq = fv_sum ^ 2;
85
86 % calculating correlation coefficient between x & y
87 corr_coeff_num = (n*f_uv) - (fu_sum*f_v_sum);
88 corr_coeff_denom = (sqrt((n*fu_sq_sum)-fu_sum_sq))*(sqrt((n*f_v_sq_sum)-f_v_sum_sq));
89 corr_coeff = corr_coeff_num / corr_coeff_denom;
90
91 fprintf('Correlation coefficient between the marks in Mathematics and the marks in Physics is: %.4f\n', corr_coeff);
92
93 % ===== OUTPUT =====
94
95 % Co-variance between the marks in Mathematics and the marks in Physics is: -15910
96
97 % =====
```