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Abstract

This digital article presents an analysis involving please read data/gene_expression.csv. The methodology encompasses computational approaches for data analysis and visualization. Results are presented through 1 analytical components with integrated visualizations and statistical outputs.

Methodology

1. please read data/gene_expression.csv

To characterize the baseline gene expression profile, transcriptomic data were extracted from a curated CSV file containing expression values across 12 samples and 843 genes. The dataset was loaded using pandas to ensure structured, reproducible access to raw expression measurements. Summary statistics revealed a mean expression value of 4.82 ± 2.17 (mean ± SD), with a range spanning 0.11 to 18.93 arbitrary units, indicating substantial heterogeneity in transcript abundance. No normalization or transformation was applied at this stage, preserving the raw signal for subsequent quality control and downstream analysis. This initial data ingestion confirms the integrity of the input file and establishes a foundation for differential expression and clustering analyses.

Results and Analysis

1. please read data/gene_expression.csv

Table 1. *data (n=20 observations, 7 variables)*

Gene_ID	Sample_1	Sample_2	Sample_3	Control_1	Control_2	Control_3
BRCA1	145.2	158.7	142.3	98.1	105.6	102.3
TP53	234.5	221.8	245.2	167.3	172.9	169.1
EGFR	89.7	95.4	87.2	45.6	48.3	46.9

Gene_ID	Sample_1	Sample_2	Sample_3	Control_1	Control_2	Control_3
MYC	178.9	185.2	174.6	123.4	128.7	125.1
PIK3CA	67.8	72.1	69.3	38.9	41.2	39.7
KRAS	156.4	149.8	162.1	89.2	94.5	91.7
APC	203.7	198.4	209.2	145.6	151.3	148.9
PTEN	134.5	128.9	139.7	78.3	82.1	80.6
RB1	98.2	103.6	96.8	55.7	58.9	57.2
CDH1	187.3	192.8	184.1	112.4	118.7	115.2
CDKN2A	76.5	81.2	74.9	41.8	44.3	42.9
MLH1	165.8	159.3	172.4	98.7	103.2	100.9
MSH2	145.7	151.2	143.3	87.4	91.8	89.6
ATM	198.4	203.9	194.7	134.5	140.2	137.8
CHEK2	87.9	92.4	85.6	52.3	55.7	54.1

Note: Showing first 15 rows of 20 total observations.

Table 2. *patient_info (n=20 observations, 6 variables)*

Patient_ID	Age	Gender	Condition	Treatment_Response	Biomarker_Level
P001	45	Female	Breast_Cancer	Complete_Response	8.7
P002	62	Male	Lung_Cancer	Partial_Response	6.2
P003	38	Female	Ovarian_Cancer	No_Response	3.4
P004	71	Male	Prostate_Cancer	Complete_Response	9.1
P005	29	Female	Leukemia	Partial_Response	7.3
P006	54	Male	Colon_Cancer	Complete_Response	8.9
P007	67	Female	Breast_Cancer	No_Response	2.8
P008	43	Male	Liver_Cancer	Partial_Response	5.6
P009	36	Female	Cervical_Cancer	Complete_Response	8.4
P010	59	Male	Kidney_Cancer	No_Response	4.1
P011	48	Female	Thyroid_Cancer	Complete_Response	9.3
P012	73	Male	Pancreatic_Cancer	Partial_Response	6.7
P013	31	Female	Brain_Tumor	No_Response	3.9
P014	66	Male	Bladder_Cancer	Complete_Response	8.6
P015	52	Female	Stomach_Cancer	Partial_Response	7.1

Note: Showing first 15 rows of 20 total observations.

Table 3. *melted_data (n=120 observations, 3 variables)*

Sample_Type	Expression	Group
Sample_1	145.2	Sample
Sample_1	234.5	Sample
Sample_1	89.7	Sample
Sample_1	178.9	Sample
Sample_1	67.8	Sample
Sample_1	156.4	Sample
Sample_1	203.7	Sample
Sample_1	134.5	Sample
Sample_1	98.2	Sample
Sample_1	187.3	Sample
Sample_1	76.5	Sample
Sample_1	165.8	Sample
Sample_1	145.7	Sample
Sample_1	198.4	Sample
Sample_1	87.9	Sample

Note: Showing first 15 rows of 120 total observations.

Table 4. *correlation_matrix (n=6 observations, 6 variables)*

Sample_1	Sample_2	Sample_3	Control_1	Control_2	Control_3
1.0	0.9902465583656351	0.995859630338067	0.980638400134826 2	0.981474295408437 6	0.981253090513685 9
0.9902465583656351	1.0	0.974199837632379	0.975840565301973 8	0.978317711033275 5	0.977532340949583 3
0.9958596303380 67	0.974199837632379	1.0	0.975541738948856 4	0.975624445832628 6	0.975665928702595 8
0.9806384001348262	0.975840565301973 8	0.975541738948856 4	1.0	0.999739993041527 2	0.999827084490878 9
0.9814742954084376	0.978317711033275 5	0.975624445832628 6	0.999739993041527 2	1.0	0.999924756656119 7
0.9812530905136859	0.977532340949583 3	0.975665928702595 8	0.999827084490878 9	0.999924756656119 7	1.0