Z Score Normalization

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Z Score Normalization

Z-Score Normalization – (Data Mining)

Z-Score helps in the normalization of data. If we normalize the data into a simpler form with the help of z score normalization, then it's very easy to understand by our brains.

Z- Score Formula

$$Z = \frac{x - \mu}{\sigma}$$

Score → x

Mean → μ

σ → SD

Z-Score Formula

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Example

How to calculate Z-Score of the following data?

marks
8
10
15
20

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

Standard deviation $= \sqrt{\dfrac{\sum\left(every\ individual\ value\ of\ marks - mean\ of\ marks\right)^2}{n}}$

Mean of marks = 8 + 10 + 15 + 20 /4 = 13.25

$$= \sqrt{\frac{(8-13.25)^2 + (10-13.25)^2 + (15-13.25)^2 + (20-13.25)^2}{4}}$$

$$= \sqrt{\frac{(-5.25)^2 + (-3.25)^2 + (1.75)^2 + (6.75)^2}{4}}$$

$$= \sqrt{\frac{27.56 + 10.56 + 3.06 + 45.56}{4}} = \sqrt{\frac{86.74}{4}} = \sqrt{21.6} = 4.6$$

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$$ZScore = \frac{x - \mu}{\sigma} = \frac{8 - 13.25}{4.6} = -1.14$$

$$ZScore = \frac{x - \mu}{\sigma} = \frac{10 - 13.25}{4.6} = -0.7$$

$$ZScore = \frac{x - \mu}{\sigma} = \frac{15 - 13.25}{4.6} = 0.3$$

$$ZScore = \frac{x - \mu}{\sigma} = \frac{20 - 13.25}{4.6} = 1.4$$

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marks	marks after z-score normalization
8	-1.14
10	-0.7
15	0.3
20	1.4

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Download Excel File Calculations

	A	B	C	D	E	F	G	H	I	J
1			https://T4Tutorials.com							
2							after z-score normalization			
3	Id	Dependː	Sal	Eucledean	Id	Dependː	Norm-Dep	Salary	Norm-Sal	Eucledean
4	E101	3	50000	0	E101	3	-0.5287788	50000	4.2954	0
5	E105	5	50000	49999.37304	E110	3	-0.5287788	45000	3.86583	0.4295716
6	E110	3	45000	5000	E113	3	-0.5287788	57000	4.8968	0.6014003
7	E113	3	57000	7000	E114	3	-0.5287788	42000	3.60809	0.6873146
8	E111	6	43000	7000.000643	E112	4	0.293766	39000	3.35035	1.2528822
9	E114	3	42000	8000	E107	3	-0.5287788	35000	3.00669	1.2887149
10	E109	5	40000	10000.0002	E108	4	0.293766	38000	3.26443	1.3188946
11	E112	4	39000	11000.00005	E102	4	0.293766	65000	5.58412	1.5288446
12	E108	4	38000	12000.00004	E104	4	0.293766	35000	3.00669	1.5288446
13	E107	3	35000	15000	E105	5	1.1163108	50000	4.2954	1.6450896
14	E102	4	65000	15000.00003	E103	3	-0.5287788	70000	6.01369	1.7182865
15	E104	4	35000	15000.00003	E109	5	1.1163108	40000	3.43626	1.8559221
16	E103	3	70000	20000	E106	1	-2.1738684	30000	2.57712	2.3788291
17	E106	1	30000	20000.0001	E111	6	1.9388556	43000	3.694	2.5398625

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FAQ about Z Score Normalization

- **How do you use a z score table?**
- **Advantages of the z score**
- **Is a higher or lower Z score better?**
- **What does a negative and a positive z score mean?**
- **Why is the mean of Z scores is 0?**
- **What is the meaning of the high Z score and low Z score?**

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