Calculating Variance of Discrete Frequency Distribution
Data Science and A.I. Lecture Series

Bindeshwar Singh Kushwaha

PostNetwork Academy

Reach PostNetwork Academy

Website
PostNetwork Academy | www.postnetwork.co

YouTube Channel
www.youtube.com/@postnetworkacademy

PostNetwork Academy Facebook Page
www.facebook.com/postnetworkacademy

LinkedIn
www.linkedin.com/company/postnetworkacademy

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i				
3.5	3				
4.5	7				
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i				
3.5	3				
4.5	7				
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				
	N=217				

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i				
3.5	3				
4.5	7				
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N}\sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N}\sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3				
4.5	7				
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7				
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7	-2			
5.5	22				
6.5	60				
7.5	85				
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85				
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32				
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N}\sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N}\sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8				
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$			
3.5	3	-3			
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3			
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2			
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1			
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0			
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1			
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2			
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3			
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2		
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9		
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4		
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1		
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0		
7.5	85	1	1		
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4		
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9		
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N}\sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N}\sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217				

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N}\sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N}\sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N}\sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N}\sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	72
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	72
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	$\sum_{i=1}^{n} f_i d_i^2 = 362$

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	72
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	$\sum_{i=1}^{n} f_i d_i^2 = 362$

Assumed Mean=6.5

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	72
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	$\sum_{i=1}^{n} f_i d_i^2 = 362$

Assumed Mean=6.5

$Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

Calculate variance using formula $Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

x_i	f_i	$d_i = x_i - 6.5$	d_i^2	$f_i d_i$	$f_i d_i^2$
3.5	3	-3	9	-9	27
4.5	7	-2	4	-14	28
5.5	22	-1	1	-22	22
6.5	60	0	0	0	0
7.5	85	1	1	85	85
8.5	32	2	4	64	128
9.5	8	3	9	24	72
	N=217			$\sum_{i=1}^{n} f_i d_i = 128$	$\sum_{i=1}^{n} f_i d_i^2 = 362$

Assumed Mean=6.5

$Var(X) = \frac{1}{N} \sum_{i=1}^{n} f_i d_i^2 - (\frac{1}{N} \sum_{i=1}^{n} f_i d_i)^2$

$= \frac{362}{217} - (\frac{362}{217})^2 = 1.321$