

Intro to Chi Square Analysis: Single variable studied in equal sub-areas

Variable studied: Salt Cedar

You visit an area where you count trees in three cells. You get the following data

Cell 1	68	This cell appears to be in the forest
Cell 2	51	This cell appears to be in a transition from the forest
Cell 3	41	This cell appears to be in a transition from the forest

Are we able to see the forest edge? What level of confidence would you have in your conclusion about the data?

Chi Square Formula: For each area: (Observed minus Expected) squared, divided by Expected then Sum all areas together for total chi value.

IF chi square is greater than 9.21 then there's something different about the distribution

Location	Observed	Expected	% Area	O-E	O-E +2	Chi
Cell 1	68	53.33333	0.333333	14.66667	215.1111	4.033333
Cell 2	51	53.33333	0.333333	-2.33333	5.444444	0.102083
Cell 3	41	53.33333	0.333333	-12.3333	152.1111	2.852083
TOTAL	160	160	1			6.9875

3 Areas, so degrees of freedom: 3 minus 1 = 2

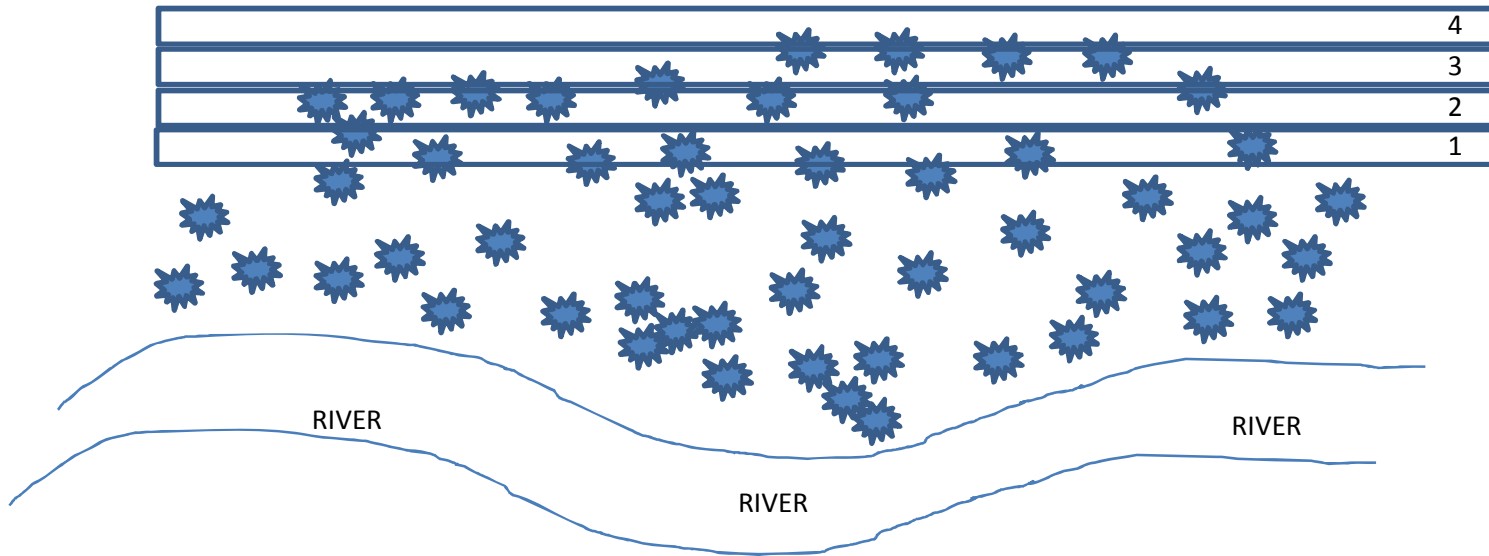
Data points Total is the same as number of cells.

In this case, chi square is 6.99

We suspect that our data is ARE distributed normally and suspect NO causal relationship may be at play.

We look up the chi square value with 2 degrees of freedom and find insufficient chi square to make our conclusion with a .01 certainty (we would be correct 99% of the time), because our chi of 6.99 does not exceed 9.21

Conclusion: We're still in the forest



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This time, we omit Cell 1 and add Cell 4 to see if we can detect the forest edge

You visit an area where you count trees in three cells. You get the following data

Cell 1	68	This cell appears to be in the forest
Cell 2	51	This cell appears to be in a transition from the forest
Cell 3	41	This cell appears to be in a transition from the forest
Cell 4	24	This cell appears to be out of the forest

Chi Square Formula: For each area: (Observed minus Expected) squared, divided by Expected then Sum all areas together for total chi value.

IF chi square is greater than 9.21 then there's something different about the distribution

Location	Observed	Expected	% Area	O-E	O-E +2	Chi
Cell 2	51	38.66667	0.333333	12.33333	152.1111	3.933908
Cell 3	41	38.66667	0.333333	2.333333	5.444444	0.140805
Cell 4	24	38.66667	0.333333	-14.6667	215.1111	5.563218
TOTAL	116	116	1			9.637931

3 Areas, so degrees of freedom: 3 minus 1 = 2

We look up the chi square value with 2 degrees of freedom and find that we could make our conclusion with a .01 certainty (we would be correct 99% of the time), because our chi of 9.64 exceeds 9.21 but is less than 13.816.

Conclusion: the boundary of the forest is the edge between cells 3 and 4