Steps to calculate the total depths per week in 400 x 400 raster:

A cell has 100 x 100 pixels, so there are 16 cells in total. The values of cells are as follows:

Rats caught：

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | 192 | 108 | 76 |
| 76 | 108 | 192 | 0 |
| 60 | 137 | 92 | 75 |
| 75 | 92 | 137 | 60 |

Population density：

|  |
| --- |
| 38 rows with a value of 108 |
| 63 rows with a value of 0 |
| 45 rows with a value of 192 |
| 78 rows with a value of 75 |
| 26 rows with a value of 92 |
| 64 rows with a value of 255 |
| 10 rows with a value of 92 |
| 76 rows with a value of 60 |

For calculation, I distribute it by 100 rows, and the right column is the population in this cell.

|  |  |
| --- | --- |
| 38rows: 108  62 rows: 0 | 38/100  62/100 |
| 1 rows: 0  45 rows: 192  54 rows: 75 | 1/100  45/100  54/100 |
| 24 rows: 75  26 rows: 92  50 rows: 255 | 24/100  26/100  50/100 |
| 14 rows: 255  10 rows: 92  76 rows :60 | 24/100  10/100  76/100 |

Using equation d=(0.8\*r)\*(1.3\*p) to calculate the average deaths per week per 100m x100m:

|  |  |  |  |
| --- | --- | --- | --- |
| =38/100\*(0.8\*0)\*(1.3\*108)+  62/100\*(0.8\*0)\*(1.3\*0) | =38/100\*(0.8\*192)\*(1.3\*108) +62/100\*(0.8\*192)\*(1.3\*0) | =38/100\*(0.8\*108)\*(1.3\*108)  +62/100\*(0.8\*108)\*(1.3\*0) | =38/100\*(0.8\*76)\*(1.3\*108) +62/100\*(0.8\*76)\*(1.3\*0) |
| =1/100\*(0.8\*76)\*(1.3\*0) +45/100\*(0.8\*76)\*(1.3\*192) +54/100\*(0.8\*76)\*(1.3\*75) | =1/100\*(0.8\*108)\*(1.3\*0) +45/100\*(0.8\*108)\*(1.3\*192) +54/100\*(0.8\*108)\*(1.3\*75) | =1/100\*(0.8\*192)\*(1.3\*0) +45/100\*(0.8\*192)\*(1.3\*192) +54/100\*(0.8\*192)\*(1.3\*75) | =1/100\*(0.8\*0)\*(1.3\*0) +45/100\*(0.8\*0)\*(1.3\*192) +54/100\*(0.8\*0)\*(1.3\*75) |
| =24/100\*(0.8\*60)\*(1.3\*75) +26/100\*(0.8\*60)\*(1.3\*92) +50/100\*(0.8\*60)\*(1.3\*255) | =24/100\*(0.8\*137)\*(1.3\*75) +26/100\*(0.8\*137)\*(1.3\*92) +50/100\*(0.8\*137)\*(1.3\*255) | =24/100\*(0.8\*92)\*(1.3\*75) +26/100\*(0.8\*92)\*(1.3\*92) +50/100\*(0.8\*92)\*(1.3\*255) | =24/100\*(0.8\*75)\*(1.3\*75) +26/100\*(0.8\*75)\*(1.3\*92) +50/100\*(0.8\*75)\*(1.3\*255) |
| =14/100\*(0.8\*75)\*(1.3\*255) +10/100\*(0.8\*75)\*(1.3\*92) +76/100\*(0.8\*75)\*(1.3\*60) | =14/100\*(0.8\*92)\*(1.3\*255) +10/100\*(0.8\*92)\*(1.3\*92) +76/100\*(0.8\*92)\*(1.3\*60) | =14/100\*(0.8\*137)\*(1.3\*255) +10/100\*(0.8\*137)\*(1.3\*92) +76/100\*(0.8\*137)\*(1.3\*60) | =14/100\*(0.8\*60)\*(1.3\*255) +10/100\*(0.8\*60)\*(1.3\*92) +76/100\*(0.8\*60)\*(1.3\*60) |

Calculate the value of each cell：

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 0.0000 | 8194.8672 | 4609.6128 | 3243.8016 |
|  | 10030.1760 | 14253.4080 | 25339.3920 | 0.0000 |
|  | 10571.8080 | 24138.9616 | 16210.1056 | 13214.7600 |
|  | 7059.0000 | 8659.0400 | 12894.4400 | 5647.2000 |
| Total |  |  |  | 164066.5728 |

Train of thought

d：Read to 100 row from the first row, add up the number from the first to read to the 100th, then divide by 10,000, we can get the average deaths per week in the first 100 x 100 square..

Similarly, if we want to add up the second grid, we need to read from first row to the 100th row. Add up the values and then divide by 10,000.

……

After figure out each 100 x 100 cell, we can add up the data of the 16 cells to get total deaths per week.