Dataset:

1. Crop\_production (99850 rows)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State\_Name | Crop\_Type | Crop | N | P | K | pH | rainfall | temperature | Area\_in\_hectares | Production\_in\_tons | Yield\_ton\_per\_hec |

2. Data\_after\_rainfall ()

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **State\_Name** | Crop\_Type | Crop | rainfall | Area\_in\_hectares | Production\_in\_tons | Yield\_ton\_per\_hec |

3. Fertilizer ()

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Crop | N | P | K | pH |

4. final\_temperature ()

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **States** | kharif\_temp | rabi\_temp | summer\_temp | yearly\_temp |

5. Final\_Dataset\_after\_temperature

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **State\_Name** | Crop\_Type | Crop | rainfall | temperature | Area\_in\_hectares | Production\_in\_tons | Yield\_ton\_per\_hec |

6. rainfall\_validation ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBDIVISION** | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

7. temperature ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **State\_Name** | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec |

Assumption for Obj1: Assume all crop production can be sold.

Objective Function1: Max Revenue (Production \* Price) (Profit? Cost?)

~~Objective Function2: Min land area~~

Decision Variable:

1. Type of Crop  (~1800)
2. State\_name (~34)
3. Production
4. Price

Parameters:

1. Demand for each crop (sum up production of each crop in each state)
2. Capacity (area size of each state)
3. Soil condition (suitable range of each crop)
   1. P
   2. N
   3. K
   4. PH
4. Rainfall (suitable range of each crop)
5. Temperature (suitable range of each crop)

Note: We can first consider only one crop\_type (Kharif/rabi/summer)

\*Cost: Setup cost/Transportation cost/

Version 2:

Objective function: Allocated(i,j) \* Yield(i,j) \* Price(i) –Labor Cost(j) – Seed Cost – Y \* Rotation Cost

Constraints:

1. Rainfall
2. Temperature
3. Demand for each crop (8 CROPS)
4. Land area

# MODEL:

# Constraints:

## Climate constraints

## Planting demand constraints

## Land area constraints