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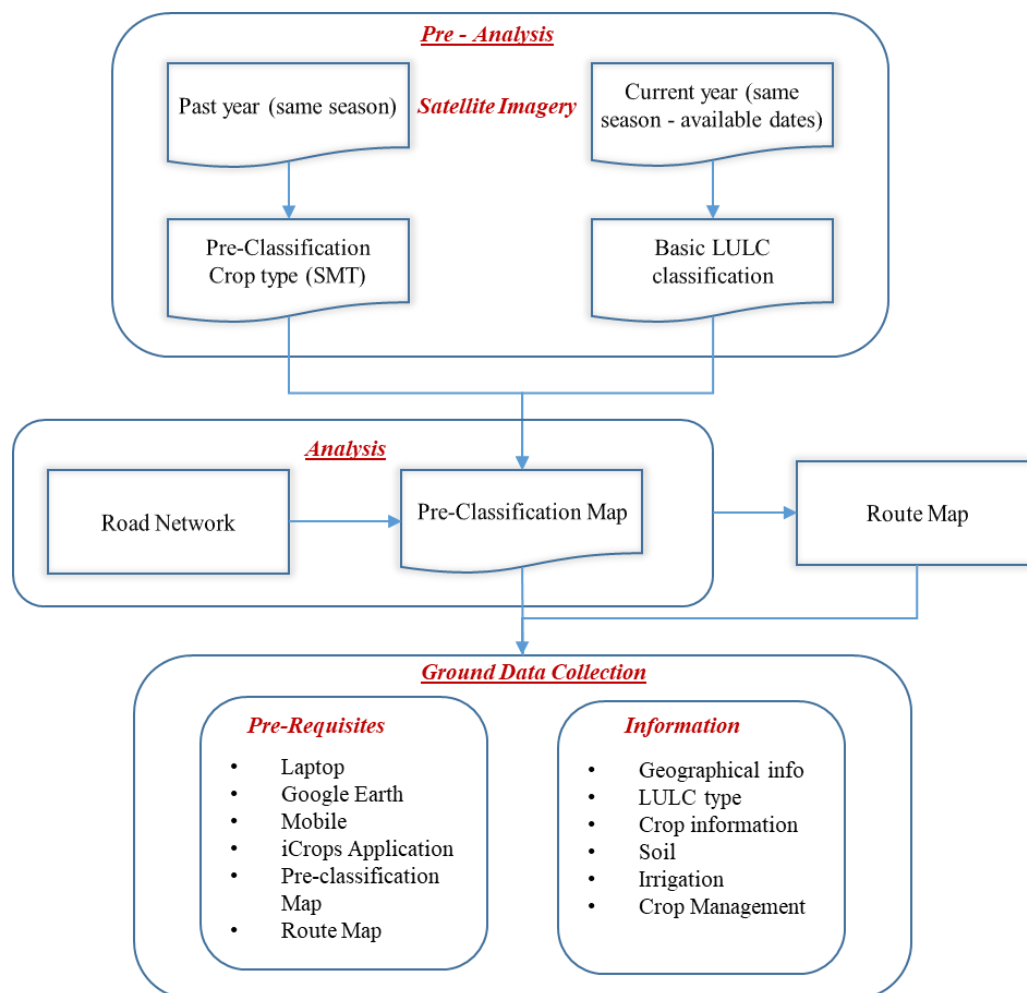**Submitted by**

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# Ground Data Collection

## I.   Detailed Methodology for Ground Data Collection

The following methodology is adopted to collect ground information as shown in figure 1



**Figure 1:** The methodology adopted to collect ground information

Before proceeding to the ground data collection, the pre-analysis is carried out using historical satellite imagery followed by drawing route map based on pre-classification map covering all major crop areas.

The preliminary crop type mapping will be prepared using satellite imagery for same season of previous year (i.e. if ground data collection is planning for present Kharif season, the preliminary classification will be done for past year Kharif season) using Spectral Matching Technology based on prior experience. Based on route map and pre-classification map, the areas with different signatures will be identified and certain areas will be targeted.

The Pre- requisites for ground data collection include Laptop with car charger, Google Earth installed and Mobile handset with iCrops installed.

The information to be collected is depends upon the application to which these ground data will be used. The information is divided into two types. Mainly Mandatory data: These data should be collected at plot.

- Location information (Latitude and Longitude) at the center of the plot
- Crop information
- Crop Stage

Other information is also required like irrigation, soil and other management information, which can be obtained with farmer interview

**Collection Procedure:**

1. The selection of crop field should be a homogeneous patch, evenly distributed (preferably 90m * 90m).

2. Must assign unique value for every collected field

3. The center point of crop field must locate in Google Maps/Earth (satellite mode) containing Latitude and Longitude values.

4. The Geo-tagged photographs must contain latitude, longitude values, time of collection, and landscape view photo of field (prefer 3 photos covering entire field) with holding ground data number (unique value for every point)

5. For every point write the percent of crop extent (e.g.: 80% crop, 20% shrubs etc.)

The data collected with above procedure can be later divided into training and validation samples and used for crop classification and accuracy assessment respectively.

## II.    Ground Data Collection - Telangana

Ground-truth data was collected during 08th March - 26th March 2023 for nearly **2500** sample sites covering all districts (Table 2) across Telangana and the major cropland areas (Figure 1) and **11,119** validation points collected. It has been observed in majority of districts contains Rice as major crop followed by Maize (Table 1).
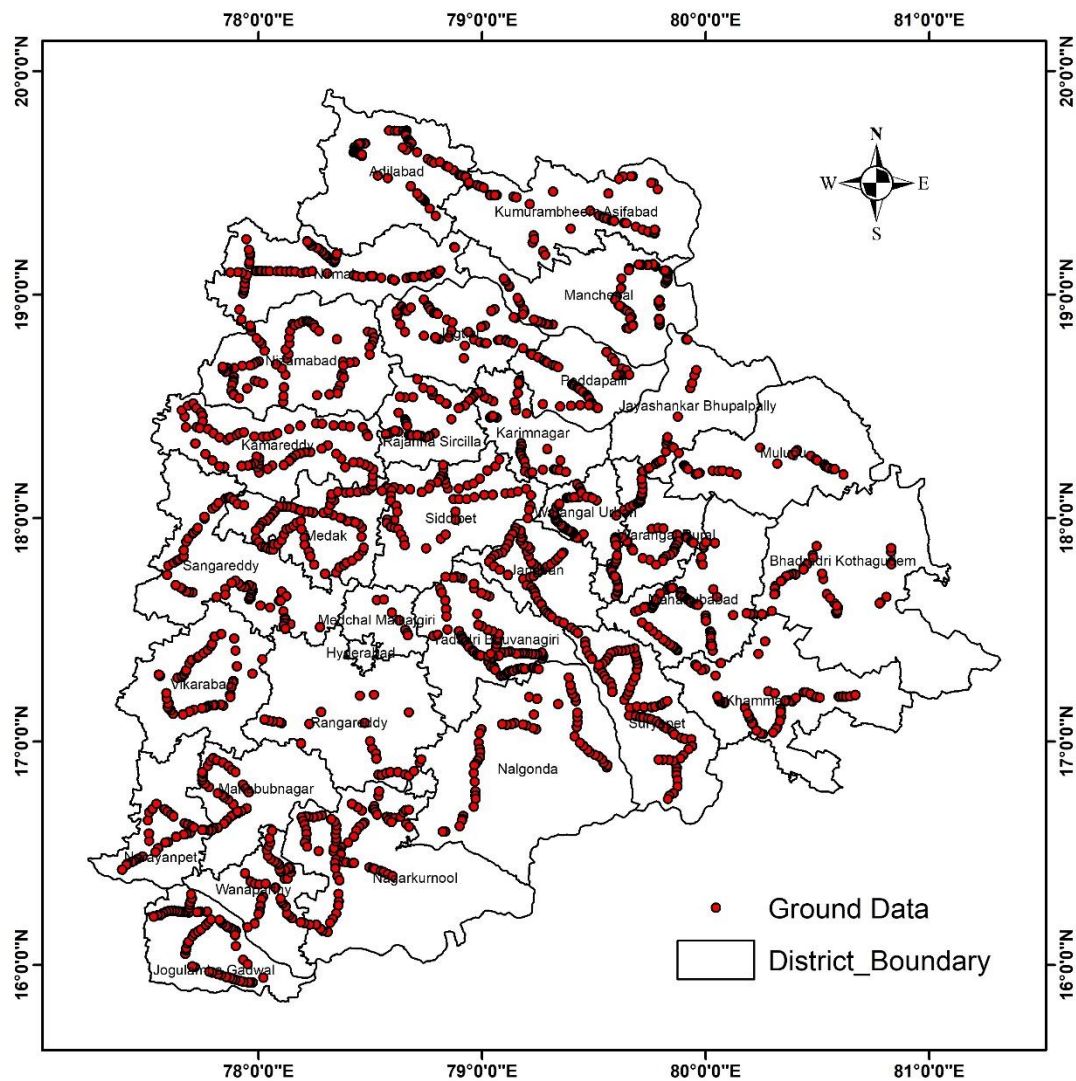
**Figure 2:** Spatial distribution of ground data across Telangana (Training Data)

At each location the following information was recorded (e.g.):

1. GPS Coordinates

2. Crop intensity (single, double and triple crops)

3. Cropping pattern (Previous/present including season wise)

4. Irrigation techniques/ watering methods:

5. Photographs

Observations were recorded extensively, while driving by road and capturing a few more locations for class identification and accuracy assessment.

**Table 1:** Crop wise – Number of points (Training)

| S. No | Crop | No. of Points |
|---|---|---|
| 1 | Barley | 8 |
| 2 | Chickpea | 13 |
| 3 | Cotton | 18 |
| 4 | Groundnut or Peanut | 36 |
| 5 | Maize(Corn) | 336 |
| 6 | Others | 61 |
| 7 | Pigeon pea | 2 |
| 8 | Rice | 1846 |
| 9 | Sorghum/Millet | 93 |
| 10 | Soybean | 3 |
| 11 | Sugarcane | 24 |
| 12 | Sunflower | 6 |
| 13 | Wheat | 12 |
| 14 | Other LULC | 26 |
| | Grand Total | 2484 |

Table 2: Crop wise – Number of Points (Validation)

| S.No | Class | No. of Points |
|---|---|---|
| 1 | Bajra | 2 |
| 2 | Banana | 3 |
| 3 | Beans | 2 |
| 4 | Brinjal | 4 |
| 5 | Built Up | 3274 |
| 6 | Cabbage | 6 |
| 7 | Cabbage & tomato | 2 |
| 8 | Carrot | 2 |
| 9 | Castor | 36 |
| 10 | Chickpea | 7 |
| 11 | Chilli | 111 |
| 12 | Cotton | 124 |
| 13 | Cotton Harvested | 227 |
| 14 | Cowpea | 3 |
| 15 | Cucumber | 1 |
| 16 | Dragonfruit | 2 |
| 17 | Fallow | 173 |
| 18 | Finger Millet | 4 |
| 19 | Flower chamanthi | 2 |
| 20 | Fodder grass | 2 |
| 21 | Forest | 245 |
| 22 | Grape Orchard | 2 |
| 23 | Grass | 2 |
| 24 | Greengram | 1 |
| 25 | Groundnut | 104 |
| 26 | Guava | 9 |
| 27 | Jowar | 103 |
| 28 | Land Preparation | 1 |

| 29 | Lemon | 53 |
|---|---|---|
| 30 | Maize | 830 |
| 31 | Maize & rice | 2 |
| 32 | Maize, cotton , sesame | 2 |
| 33 | Mango | 386 |
| 34 | Mixed crop | 2 |
| 35 | Mulberry | 2 |
| 36 | Neem plantation | 2 |
| 37 | Onion | 10 |
| 38 | Orchard | 22 |
| 39 | Pigeon Pea | 2 |
| 40 | Plantation mgforest | 2 |
| 41 | Red Gram | 1 |
| 42 | Rice | 4548 |
| 43 | Rice, Sunflower | 1 |
| 44 | Rice,Maize | 4 |
| 45 | Rice,Sorghum | 1 |
| 46 | Rice,Sugarcane | 1 |
| 47 | Safflower | 27 |
| 48 | Sapota | 1 |
| 49 | Sesame | 48 |
| 50 | Shrub | 517 |
| 51 | Sorghum | 86 |
| 52 | Sorghum,Rice | 1 |
| 53 | Soya | 7 |
| 54 | Sugarcane | 37 |
| 55 | Sun Flower | 10 |
| 56 | Teak Plantation | 2 |
| 57 | Til | 4 |
| 58 | Tobacco | 8 |
| 59 | Tomato | 15 |
| 60 | Vegetables | 12 |
| 61 | Water melon | 2 |
| 62 | Wheat | 17 |
| | **Total** | **11119** |

It is evident that Telangana is dominant with Rice Crop and also contains various diversity of crops in forest areas and small holding farms.

**Table 2:** District wise – Number of Samples (Training)

| S.No | District | No. of Points |
|---|---|---|
| 1 | Adilabad | 85 |
| 2 | Bhadradri Kothagudem | 51 |
| 3 | Jagtial | 71 |
| 4 | Jangoan | 86 |
| 5 | Jayashankar Bhupalpally | 24 |
| 6 | Jogulamba Gadwal | 101 |
| 7 | Kamareddy | 118 |
| 8 | Karimnagar | 64 |

| 9 | Khammam | 77 |
|---|---|---|
| 10 | Kumurambheem Asifabad | 62 |
| 11 | Mahabubabad | 98 |
| 12 | Mahabubnagar | 58 |
| 13 | Mancherial | 93 |
| 14 | Medak | 111 |
| 15 | Medchal Malkajgiri | 8 |
| 16 | Mulugu | 40 |
| 17 | Nagarkurnool | 121 |
| 18 | Nalgonda | 86 |
| 19 | Narayanpet | 51 |
| 20 | Nirmal | 94 |
| 21 | Nizamabad | 93 |
| 22 | Peddapalli | 63 |
| 23 | Rajanna Sircilla | 56 |
| 24 | Rangareddy | 40 |
| 25 | Sangareddy | 81 |
| 26 | Siddipet | 89 |
| 27 | Suryapet | 128 |
| 28 | Vikarabad | 71 |
| 29 | Wanaparthy | 65 |
| 30 | Warangal Rural | 76 |
| 31 | Warangal Urban | 77 |
| 32 | Yadadri Bhuvanagiri | 146 |
| | Total | 2484 |

The farmers in the districts with better irrigations are chosen Rice and Maize crops for cultivation.

**Conclusions:**

1. Intensive field-plot information throughout the Telangana state was conducted.
2. Overall 2484 training points and 11,119 validation points collected across Telangana
3. Verified preliminary classification with support of GPS online tracking and Google Earth High Resolution imagery
4. Preliminary Quality assessment was conducted