

Microsoft Azure - Machine Learning Process flow
For
Crops classification using Satellite Images



Madhya Pradesh Agency For
Promotion of
Information Technology

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1. Problem Statement:

Prediction of different crop types using a combination of pixel values obtained from optical satellite image.

2. Data Sources:

ResourceSat-I LISS 4 satellite image and Girdawari Information

3. PROCESS WORK FLOW:

3.1 Data Description:

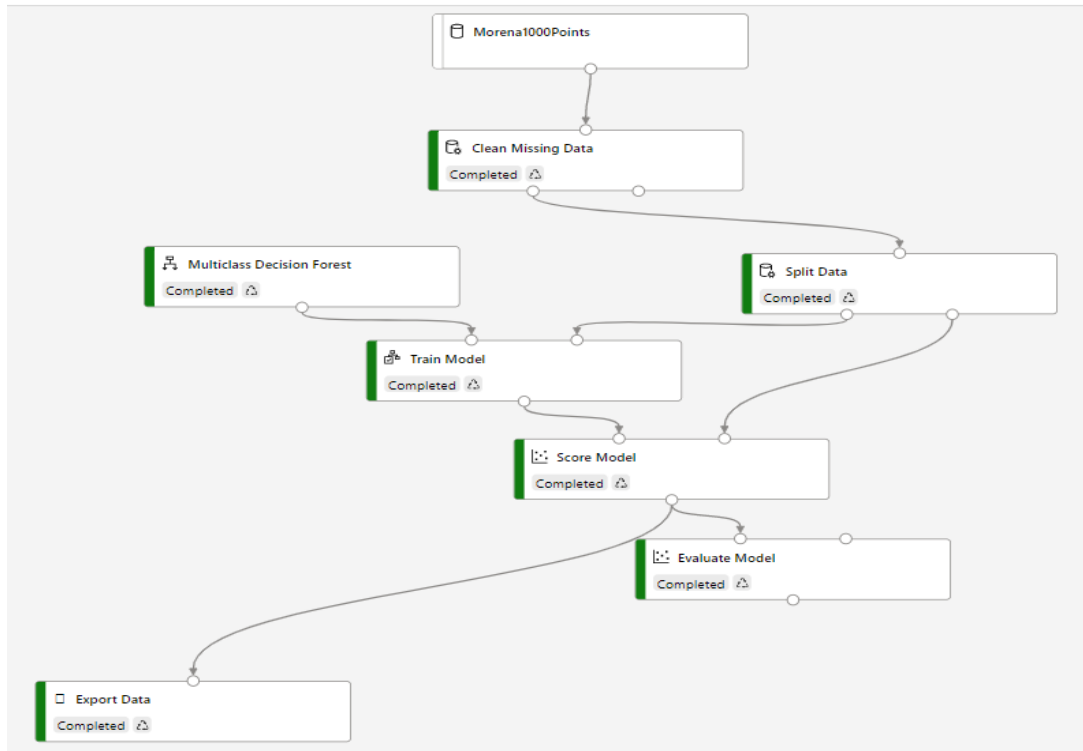
| LISS-3 (Linear Imaging Self Scanning sensor-IV) of ResourceSat-2 Satellite | | |
|--|-------------|--------------------|
| Band Name | Wave Length | Spatial Resolution |
| B2 - Green | 0.52 - 0.59 | 5.8 |
| B3 - Red | 0.62 - 0.68 | 5.8 |
| B4 - NIR | 0.77 - 0.86 | 5.8 |

3.2 Pre-processing:

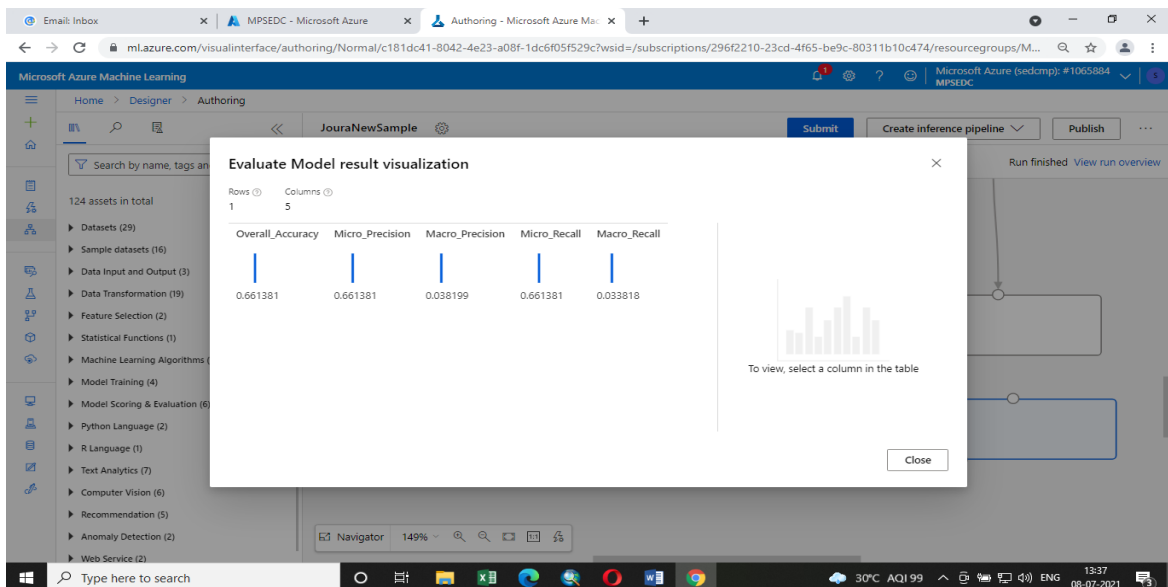
Pre-processing and cleaning of the satellite data is very crucial part of this analysis. The data available in raster file format in three bands of different wavelength was first orthorectified and masked for the study area. The data was kept in its original structure and no enhancement or stretching technique were applied. Fasal Girdawari records were acquired and joined with the Khasra boundary file and converted in to point data keeping the centroid as data point. The converted Khasra points were finally used to extract the pixel value from all the image bands pertaining to the point.

3.3 Machine Learning Algorithm used:

Azure Machine Learning: Crop Type Classification



4. RESULTS:



Export Output in .csv Format:

Azure Machine Learning: Crop Type Classification

| Khasra Number | CropName | Band 1 | Band 2 | Band 3 | Scored Probabilities_Gram | Scored Probabilities_Mustard | Scored Probabilities_Wheat | Scored Labels |
|---------------|----------|--------|--------|--------|---------------------------|------------------------------|----------------------------|---------------|
| 586 | Mustard | 99 | 86 | 238 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 327 | Gram | 82 | 75 | 160 | 0.438891097 | 0.154754847 | 0.406354056 | Gram |
| 820 | Mustard | 113 | 108 | 216 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 1586 | Wheat | 82 | 73 | 146 | 0.363891097 | 0.154754847 | 0.481354056 | Wheat |
| 372 | Gram | 96 | 89 | 141 | 0.568643054 | 0.314180941 | 0.117176004 | Gram |
| 357 | Wheat | 81 | 80 | 126 | 0.22988127 | 0.142920528 | 0.627198202 | Wheat |
| 1121 | Mustard | 120 | 122 | 224 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 910 | Wheat | 76 | 55 | 217 | 0.25223688 | 0.006349119 | 0.741414001 | Wheat |
| 254 | Wheat | 79 | 58 | 221 | 0.25223688 | 0.006349119 | 0.741414001 | Wheat |
| 690 | Gram | 99 | 72 | 240 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 673 | Mustard | 90 | 70 | 255 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 2181 | Gram | 75 | 58 | 232 | 0.25223688 | 0.006349119 | 0.741414001 | Wheat |
| 213 | Mustard | 92 | 72 | 253 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 18 | Mustard | 91 | 68 | 255 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 110 | Mustard | 90 | 68 | 241 | 0.276362642 | 0.693218865 | 0.030418493 | Mustard |
| 273 | Gram | 85 | 76 | 167 | 0.572395022 | 0.082443019 | 0.345161959 | Gram |
| 2147 | Gram | 80 | 55 | 246 | 0.25223688 | 0.006349119 | 0.741414001 | Wheat |
| 271 | Gram | 74 | 55 | 239 | 0.217789206 | 0.004314235 | 0.777896559 | Wheat |
| 1502 | Gram | 125 | 124 | 191 | 0.385409613 | 0.557474682 | 0.057115705 | Mustard |
| 854 | Wheat | 79 | 58 | 222 | 0.443184155 | 0.004179736 | 0.552636109 | Wheat |
| 160 | Gram | 78 | 60 | 182 | 0.513880923 | 0.003770794 | 0.482348283 | Gram |
| 764 | Gram | 81 | 64 | 202 | 0.260780953 | 0.077751288 | 0.661467759 | Wheat |

5. Deploy the Model with Real-Time Endpoints:

The model is being integrated in SAARA (स्मार्ट एप्लीकेशन फॉर रेवेन्यू एडमिनिस्ट्रेशन) application of the Madhya Pradesh Government.

The screenshot shows the Azure Machine Learning portal interface. The left sidebar contains navigation options like 'New', 'Home', 'Notebooks', 'Automated ML', 'Designer', 'Assets', 'Datasets', 'Experiments', 'Pipelines', 'Models', 'Endpoints', and 'Manage'. The main area displays the 'croppoint' endpoint configuration. Under the 'Test' tab, there are input fields for 'Sr No' (value: 1), 'khasranum' (value: 2329), 'CropType' (value: Mustard), 'Band_1' (value: 84), and 'Band_2' (value: 64). To the right, a table lists the output keys and their values, such as 'CropType' (Mustard), 'Band_1' (84), 'Band_2' (64), and various 'Scored Probabilities' for different crops like Bajra, Gram, Jua, Mustard, Paddy, Sugarcane, and Toor.