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# CROP IDENTIFICATION<sup>BETA</sup>

*API Documentation*  
*2019*

## Service Overview

The Ag-Analytics® Crop Identification API timely and accurately determines the spatial distribution, area, and type of crops present on a given field. This beta version uses machine learning models to provide a back-filling crop identification service meaning that it is used for the past years in the field where all the relevant information exists, but the crop type is uncertain.

## Model Specifications

The Crop Identification Model, of which the Crop Identification API is based on, takes four main factors into consideration: Location, Weather, Soil information, and Remote Sensing Satellite Imagery/Data. Location, weather, and soil are the three most determining factors in if a given crop will be planted and thrive in a certain area. Remote Sensing Satellite imagery/Data provides near real-time information of a given crop at different developing stages during its growing season.

### Data Overview

Factor	Variables	Data Retrieved Time	Description
Location	Latitude (resolution 0.0001 ~8m)	NA	Location is critical in determining the crop type. Farmers in Florida may not plant the same crop as farmers in Minnesota
	Longitude (resolution 0.0001 ~8m)	NA	
Weather	Growing Degree Days	March, April, May, June, July, August	Monthly growing degree days (GDD) and precipitation data starting from March to August.
	Precipitation	March, April, May, June, July, August	
Soil	National Commodity Crop Productivity Index	NA	Different crops will thrive on different soil conditions. National Commodity Crop Productivity Index (NCCPI) indicates the productivity of the soil.
	Soil pH	NA	
	Blue band	Week of the year: 18-36	



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Satellite Images	Green band	Week of the year: 18-36	Biweekly remote sensing satellite images starting from early May to early September (18 weeks window) from Ag-Analytics® Harmonized Landsat Sentinel service. Bands used in our model Blue, Green, Red, Near Infrared, and two Shortwave Near Infrared bands.
	Red band	Week of the year: 18-36	
	NIR band	Week of the year: 18-36	
	SWIR1 band	Week of the year: 18-36	
	SWIR2 band	Week of the year: 18-36	

## POST Request

### Header Parameters

Execute Type: POST

content-type: "application/json"

## API Specifications

### Request Parameters

Parameter	Data Type	Required?	Default	Options	Description
SHAPE	Geometry, file/text	Yes	-	GeoJSON (file/text); JSON geometry objects (file/text)	Desired area-of-interest. See Fig. 1 for example.
CropSeason	Text	Yes	-	2013 -2019	The year of interest to retrieve the crop type information. Ex. "2018"
ModelType	Text String	No*	NN	"NN" (Neural Network)  "TREE" (Decision Tree)	The type of AI Model to be used. Ex. "NN" corresponds to Neural Network



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## Response Parameters

Parameter	Type	Description
<b>feature_averages</b>	List	Averages of the bi-week remote sensing data and monthly weather data of the area-of-interest: I. <b>Greenweek#</b> : Green band value on the # week of the year II. <b>Blueweek#</b> : Blue band value on the # week of the year III. <b>Redweek#</b> : Red band value on the # week of the year IV. <b>NIRweek#</b> : Near Infrared band value on the # week of the year V. <b>SWIR1week#</b> : Shortwave Infrared band 1 value on the # week of the year VI. <b>SWIR2week#</b> : Shortwave Infrared band 2 value on the # week of the year VII. <b>GDD#</b> : Monthly growing degree days VIII. <b>Precipitation#</b> : Monthly precipitation
<b>raster_filename</b>	-	URL to download result raster (.tif) file.
<b>rasterinfo.CellSize</b>	Resolution	Resolution of result Geotiff file in meters.
<b>rasterinfo.CoordinateSystem</b>	-	Information about the projection of the raster.
<b>rasterinfo.Extent</b>	-	Extents of the result raster. Specifies the bottom left and top right corners of the field raster in degrees.
<b>rasterinfo.Legend</b>	List	Legend gives the following details for each range of values: I. <b>Area</b> : Area covered II. <b>AreaUnit</b> : Unit of Area covered III. <b>AreaPercent</b> : Area covered in percentage. IV. <b>Count</b> : # of pixels from the result raster in that range V. <b>CountAllPixels</b> : Total # of pixels in the result raster VI. <b>CropID</b> : Code for the crop identified by model. See Figure 4 VII. <b>CropName</b> : Crop name identified by the model VIII. <b>Color</b> : Hex color used for the crop type
<b>rasterinfo.pngb64</b>	Link	Base64png image of the result raster with legend entries.



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## GET Request

### Header Parameters

Execute Type: GET

content-type: "application/json"

## API Specifications

### Request Parameters

Parameter	Data Type	Required	Default	Options	Description
Filename	Text	Yes	-	.tif file	Filename that is returned by the initial POST request. Ex: "result_cropidraster_20191126_183736_2356.tif"

### Response Parameters

Parameter	Data Type	Description
File	.tif	Tiff file will be download to the computer of the caller with the name that was used to call the API.



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## Appendix

Figure 1 – Shape Example, GeoJSON

Figure 2 – POST Request Example

Figure 3 – POST Response Example

Figure 4 – GET Request Example

Figure 5 –Crop Names and IDs

### Figure 1.

*Shape Example - GeoJSON*

```
"{"type":"Feature","properties":{"geometry":{"type":"Polygon","coordinates":[[[-100.953840994,38.5946753571],[-100.953832008,38.5948720599],[-100.953876941,38.5952162884],[-100.953957821,38.5955324152],[-100.953984781,38.5955745654],[-100.954029714,38.5957361407],[-100.954245394,38.5961716896],[-100.954452087,38.5964807873],[-100.95473966,38.5968179832],[-100.954910406,38.596965506],[-100.954910406,38.5969795557],[-100.954982299,38.5970287299],[-100.954982299,38.5970427797],[-100.955359739,38.5973378239],[-100.955377712,38.5973378239],[-100.955629338,38.5975134449],[-100.956042724,38.5977312143],[-100.956357257,38.5978646856],[-100.956707736,38.5979911318],[-100.957175042,38.598110553],[-100.957615388,38.5981878255],[-100.958055734,38.598229974],[-100.958514053,38.5982369988],[-100.958963386,38.5982088998],[-100.959412719,38.5981456769],[-100.959906984,38.5980332805],[-100.96023949,38.5979279087],[-100.960598957,38.5977874128],[-100.960976396,38.5976047676],[-100.961281942,38.597422122],[-100.961560528,38.5972113765],[-100.961578502,38.5972113765],[-100.961848101,38.5969865806],[-100.961982901,38.5968390579],[-100.962018848,38.5968179832],[-100.962189594,38.5966283107],[-100.962315407,38.5964526876],[-100.962405274,38.5964526876],[-100.962405274,38.5963894631],[-100.962369327,38.5963894631],[-100.962369327,38.5963754133],[-100.962513113,38.5961716896],[-100.96262994,38.5959539155],[-100.962800686,38.5955324152],[-100.962908526,38.595054712],[-100.962926499,38.5948580097],[-100.962890553,38.5948509846],[-100.962962446,38.5948650348],[-100.963025352,38.5947947839],[-100.962998393,38.5947877588],[-100.962989406,38.5947666835],[-100.962917513,38.5947526333],[-100.962935486,38.5947245329],[-100.962926499,38.5946894073],[-100.962881566,38.5947034575],[-100.962665886,38.5946823822],[-100.958541013,38.5946753571],[-100.9584152,38.5947175077],[-100.958316347,38.5947175077],[-100.958298374,38.5947034575],[-100.958154587,38.5946753571],[-100.953840994,38.5946753571]]]}}
```



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Figure 2

Request Example – application/json

```
application/json
{"SHAPE":
{"type": "Feature", "properties": {}, "geometry": {"type": "Polygon", "coordinates": [[[-100.953840994, 38.5946753571], [-100.953832008, 38.5948720599], [-100.953876941, 38.5952162884], [-100.953957821, 38.5955324152], [-100.953984781, 38.5955745654], [-100.954029714, 38.5957361407], [-100.954245394, 38.5961716896], [-100.954452087, 38.5964807873], [-100.95473966, 38.5968179832], [-100.954910406, 38.596965506], [-100.954910406, 38.5969795557], [-100.954982299, 38.5970287299], [-100.954982299, 38.5970427797], [-100.955359739, 38.5973378239], [-100.955377712, 38.5973378239], [-100.955629338, 38.5975134449], [-100.956042724, 38.5977312143], [-100.956357257, 38.5978646856], [-100.956707736, 38.5979911318], [-100.957175042, 38.598110553], [-100.957615388, 38.5981878255], [-100.958055734, 38.598229974], [-100.958514053, 38.5982369988], [-100.958963386, 38.5982088998], [-100.959412719, 38.5981456769], [-100.959906984, 38.5980332805], [-100.96023949, 38.5979279087], [-100.960598957, 38.5977874128], [-100.960976396, 38.5976047676], [-100.961281942, 38.597422122], [-100.961560528, 38.5972113765], [-100.961578502, 38.5972113765], [-100.961848101, 38.5969865806], [-100.961982901, 38.5968390579], [-100.962018848, 38.5968179832], [-100.962189594, 38.5966283107], [-100.962315407, 38.5964526876], [-100.962405274, 38.5964526876], [-100.962405274, 38.5963894631], [-100.962369327, 38.5963894631], [-100.962369327, 38.5963754133], [-100.962513113, 38.5961716896], [-100.96262994, 38.5959539155], [-100.962800686, 38.5955324152], [-100.962908526, 38.595054712], [-100.962926499, 38.5948580097], [-100.962890553, 38.5948509846], [-100.962962446, 38.5948650348], [-100.963025352, 38.5947947839], [-100.962998393, 38.5947877588], [-100.962989406, 38.5947666835], [-100.962917513, 38.5947526333], [-100.962935486, 38.5947245329], [-100.962926499, 38.5946894073], [-100.962881566, 38.5947034575], [-100.962665886, 38.5946823822], [-100.958541013, 38.5946753571], [-100.9584152, 38.5947175077], [-100.958316347, 38.5947175077], [-100.958298374, 38.5947034575], [-100.958154587, 38.5946753571], [-100.953840994, 38.5946753571]]]},
"ScalarVariables": {
"CropSeason": "2018"
},
"ModelType": "NN"
}
```

Figure 3

Response – application/json

```
{
  "feature_averages": {
    "Blueweek18": 779.824844896861,
    "Blueweek20": 1975.2838106368124,
    "Blueweek22": 733.3521051359988,
    "Blueweek24": 643.9180616872748,
    "Blueweek26": 344.2115098055459,
    "Blueweek28": 235.72472900506003,
    "Blueweek30": 204.4056550889475,
    "Blueweek32": 216.0730864324732,
    "Blueweek34": 266.59034645931484,
    "Blueweek36": 622.0089586686997,
    "GDD3": 40.4415,
    "GDD4": 88.57439999999999,
    "GDD5": 567.5903999999999,
    "GDD6": 808.3584,
    "GDD7": 216.13589999999996,
    "GDD8": 0.0,
    "Greenweek18": 1138.131570659558,
    "Greenweek20": 2254.270159289066,
    "Greenweek22": 1013.7187401697631,
    "Greenweek24": 928.849268847287,
    "Greenweek26": 571.9230231878212,
    "Greenweek28": 457.9029104885397,
    "Greenweek30": 384.65050915319665,
    "Greenweek32": 375.24875445591255,
    "Greenweek34": 540.8961853834992,
    "Greenweek36": 749.1952922510966,
    "NIRweek18": 2970.0740078383446,
    "NIRweek20": 3536.6660938053815,
    "NIRweek22": 2412.510195847856,
    "NIRweek24": 3292.298120071036,
    "NIRweek26": 3535.8988991057713,
    "NIRweek28": 3721.192446778267,
    "NIRweek30": 3591.1494805204393,
    "NIRweek32": 3262.5500419977257,
    "NIRweek34": 3012.6094064752187,
    "NIRweek36": 2956.2582454919366,
    "Precipitation3": 11.524,
    "Precipitation4": 25.41900000000001,
    "Precipitation5": 70.78399999999999,
    "Precipitation6": 152.91100000000003,
    "Precipitation7": 1.4809999999999999,
    "Precipitation8": 0.0,
    "Redweek18": 1903.1859603449168,
    "Redweek20": 2480.602444221482,
    "Redweek22": 1324.5397082727213,
```



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```
"Redweek24": 1069.7853810301349,
"Redweek26": 512.0971963633662,
"Redweek28": 379.9113349957818,
"Redweek30": 283.1936926800272,
"Redweek32": 279.2847222138893,
"Redweek34": 467.8558782624387,
"Redweek36": 727.4151962193739,
"SWIR1week18": 3338.836322033022,
"SWIR1week20": 3808.579113377245,
"SWIR1week22": 3199.2655615880494,
"SWIR1week24": 1902.9297659572896,
"SWIR1week26": 1254.004163243775,
"SWIR1week28": 677.788417488776,
"SWIR1week30": 962.4707162781339,
"SWIR1week32": 994.7986702873936,
"SWIR1week34": 865.6824701031575,
"SWIR1week36": 628.7585803430337,
"SWIR2week18": 2391.667558326072,
"SWIR2week20": 2977.71718115419,
"SWIR2week22": 2392.3059762302105,
"SWIR2week24": 1066.0881596873523,
"SWIR2week26": 577.5711350554554,
"SWIR2week28": 14.881174763569534,
"SWIR2week30": 305.1543742073506,
"SWIR2week32": 299.5264928749243,
"SWIR2week34": 805.5621165630723,
"SWIR2week36": 193.83389703934495
},
"raster_filename": "result_cropidraster_20191126_183736_2356.tif",
"rasterinfo": {
  "CellSize": [
    0.0001,
    -0.0001
  ],
  "CoordinateSystem": "GEOGCS[\"WGS 84\",DATUM[\"WGS_1984\",SPHEROID[\"WGS 84\",6378137,298.257223563,AUTHORITY[\"EPSG\",\"7030\"]],AUTHORITY[\"EPSG\",\"6326\"],PRIMEM[\"Greenwich\",0],UNIT[\"degree\",0.0174532925199433],AUTHORITY[\"EPSG\",\"4326\"]]",
  "Extent": "-100.963025352, 38.5946369988, -100.953925352, 38.5982369988",
  "Legend": [
    {
      "Area": 4.969644751890395,
      "AreaPercent": '3.82 %',
      "AreaUnit": "ac",
      "Count": 101,
      "CountAllPixels": 2645,
      "CropID": 1,
      "CropName": "CORN_WET",
      "color": "#e8aba4"
    }
  ],
}
```





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```
{
  "Area": "96.18 %",
  "Area": 125.17600246345707,
  "AreaPercent": "96.18 %",
  "AreaUnit": "ac",
  "Count": 2544,
  "CountAllPixels": 2645,
  "CropID": 4,
  "CropName": "WHEAT_HRD_RD_SPR",
  "color": "#9d250e"
},
{
  "pngb64": "data:image/png;base64,
iVBORw0KGgoAAAANSUgAAAFsAAAAkCAYAAADmQkaNAAABCKlEQVR4nO3Xuw3CMBSFYdsD0DECKzEXXbq
MxAKR0jEBFSgY27l+3OM8zt9GSpSPI0dYs6Eet8uscd/783XVuG9utufDtXA19fgB4Ng9gWOH4CHYwW5OpQ
mVir0nZD8NdBXsPSP7tURvin0kZL8W6E2wj4zsV4Puah9+Jmhj6t63eNlnQ/YrWXgR9tmhl+WgZx8jhP4tx
yMLm9DhpC5ibEKnk/iIsAkta81pFZvQeaw8ktiELivmFsUmdF0hv+p/kExeEJurbpPv+IdNaL14jCi3HK+L
XWDt47IBfUZMbGBfbB4huk3jMHPZwIgNzBnDIwQVlw2M2MCIDYzYwBw/jri4bGB2GgcuG9Qbz/tZxU5PLj0
AAAAASUVORK5CYII="
}
```



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## Figure 4

*CropNames and Crop IDs*

Code	CropName
36	Alfalfa
75	Almonds
68	Apples
223	Apricots
92	Aquaculture
207	Asparagus
21	Barley
65	Barren
131	Barren
242	Blueberries
214	Broccoli
39	Buckwheat
243	Cabbage
38	Camelina
55	Caneberries
31	Canola
209	Cantaloupes
206	Carrots
244	Cauliflower
245	Celery
66	Cherries
51	ChickPeas
70	ChristmasTrees
72	Citrus
81	Clouds/NoData
58	Clover/Wildflowers
1	Corn



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Code	CropName
2	Cotton
250	Cranberries
50	Cucumbers
237	DblCropBarley/Corn
235	DblCropBarley/Sorghum
254	DblCropBarley/Soybeans
241	DblCropCorn/Soybeans
234	DblCropDurumWht/Sorghum
233	DblCropLettuce/Barley
231	DblCropLettuce/Cantaloupe
232	DblCropLettuce/Cotton
230	DblCropLettuce/DurumWht
226	DblCropOats/Corn
239	DblCropSoybeans/Cotton
240	DblCropSoybeans/Oats
225	DblCropWinWht/Corn
238	DblCropWinWht/Cotton
236	DblCropWinWht/Sorghum
26	DblCropWinWht/Soybeans
141	DeciduousForest
82	Developed
124	Developed/HighIntensity
122	Developed/LowIntensity
123	Developed/MedIntensity
121	Developed/OpenSpace
42	DryBeans
22	DurumWheat
248	Eggplants
142	EvergreenForest



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Code	CropName
61	Fallow/IdleCropland
32	Flaxseed
63	Forest
208	Garlic
249	Gourds
69	Grapes
176	Grassland/Pasture
219	Greens
195	HerbaceousWetlands
57	Herbs
213	HoneydewMelons
56	Hops
52	Lentils
227	Lettuce
29	Millet
14	Mint
47	MiscVegs&Fruits
143	MixedForest
35	Mustard
218	Nectarines
88	Nonag/Undefined
28	Oats
211	Olives
49	Onions
111	OpenWater
212	Oranges
44	OtherCrops
37	OtherHay/NonAlfalfa
25	OtherSmallGrains



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Code	CropName
71	OtherTreeCrops
67	Peaches
10	Peanuts
77	Pears
53	Peas
74	Pecans
216	Peppers
112	PerennialIce/Snow
204	Pistachios
220	Plums
217	Pomegranates
13	PoporOrnCorn
43	Potatoes
210	Prunes
229	Pumpkins
246	Radishes
34	RapeSeed
3	Rice
27	Rye
33	Safflower
64	Shrubland
152	Shrubland
59	Sod/GrassSeed
4	Sorghum
5	Soybeans
30	Speltz
23	SpringWheat
222	Squash
221	Strawberries



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Code	CropName
41	Sugarbeets
45	Sugarcane
6	Sunflower
12	SweetCorn
46	SweetPotatoes
60	Switchgrass
11	Tobacco
54	Tomatoes
205	Triticale
247	Turnips
224	Vetch
76	Walnuts
83	Water
48	Watermelons
87	Wetlands
24	WinterWheat
190	WoodyWetlands



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**Spatial Reference Information:**

Universal Transverse Mercator (UTM) Dominant Zone, North American Datum 1983

Please contact **[support@analytics.ag](mailto:support@analytics.ag)**, **[josh@ag-analytics.org](mailto:josh@ag-analytics.org)**, or **[woodardjoshua@gmail.com](mailto:woodardjoshua@gmail.com)** with any comments or questions.