Ag-Analytics

CROP IDENTIFICATION^{BETA}

API Documentation 2020
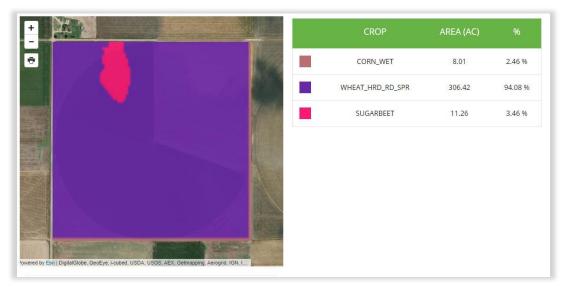

 API Portal | GitHub Repo | Jupyter Notebook | Purchase

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.

CROP	AREA (AC)	%
CORN_WET	8.01	2.46 %
WHEAT_HRD_RD_SPR	306.42	94.08 %
SUGARBEET	11.26	3.46 %

CropAI shown in FarmScope

Data Overview

Factor	Variables	Data Retrieval Time	Description
Location	Latitude (resolution 0.0001 ~8m)	N/A	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)	N/A	
Weather	Growing Degree Days	March, April, May, June, July, August	Monthly growing degree days (GDD) and precipitation data starting from March to August.
	Precipitation		
Soil	National Commodity Crop Productivity Index	N/A	Different crops will thrive on different soil conditions. National Commodity Crop Productivity Index (NCCPI) indicates the productivity of the soil.
	Soil pH	N/A	
Satellite Images	Blue 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.
	Green Band		
	Red Band		
	NIR Band		
	SWIR1 Band		
	SWIR2 Band		

POST Request

Request Parameters

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

Header Parameters

content-type:"application/json"

Request Example

POST Request Example – application/json

```
{
"SHAPE":
"{"type": "Feature", "properties": {}, "geometry": {"type": "Polygon", "coo
rdinates" :[[[-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],[-100.962998393, 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"
}
```

POST Response

POST Response Example – application/json

Response Parameters

Parameter	Data Type	Description
feature_averages	Dictionary	Averages of the bi-week remote sensing data and monthly weather data of the area-of-interest: I. **Greenweek#**: Green band value on the # week of the year II. **Blueweek#**: Blue band value on the # week of the year III. **Redweek#**: Red band value on the # week of the year IV. **NIRweek#**: Near Infrared band value on the # week of the year V. **SWIR1week#**: Shortwave Infrared band 1 value on the # week of the year VI. **SWIR2week#**: Shortwave Infrared band 2 value on the # week of the year VII. **GDD#**: Monthly growing degree days VIII. **Precipitation#**: Monthly precipitation
raster_filename	String	URL to use in GET request to retrieve predicted raster file.
rasterinfo	List of Dictionaries	Container for the features and metadata information for the raster.
CellSize	List	Size of a single cell in the raster in degrees. (0.0001, -0.0001) roughly corresponds to an 8 meter by 8-meter square on the Earth's equator.
CoordinateSystem	String	Information about the coordinate system being used for calculations.
Extent	String	Extents of the result raster. Specifies the bottom left and top right corners of the field raster in degrees.
Legend	List of Dictionaries	Legend gives the following details for each range of values: Area: I. **Area**: Area covered II. **AreaUnit**: Unit of Area covered III. **AreaPercent**: Area covered in percentage. IV. **Count**: # of pixels from the result raster in that range V. **CountAllPixels**: Total # of pixels in the result raster VI. **CropID**: Code for the crop identified by model. See Figure 4 VII. **CropName**: Crop name identified by the model VIII. **Color**: Hex color used for the crop type
pngb64	Link	Base64png image of the result raster with legend entries.

Response Example

POST Request Example – application/json

```json
{
  "feature_averages": {
    "Blueweek18": 779.824844896861, "Blueweek20": 1975.2838106368124,
    "GDD3": 40.4415, "GDD4": 88.57439999999998,
    "Greenweek18": 1138.131570659558, "Greenweek20": 2254.270159289066,
    "NIRweek18": 2970.0740078383446, "NIRweek20": 3536.6660938053815,
    "Precipitation3": 11.524, "Precipitation4": 25.41900000000001,
    "Redweek18": 1903.1859603449168,"Redweek20": 2480.602444221482,
    "SWIR1week18": 3338.836322033022, "SWIR1week20": 3808.579113377245,
    "SWIR2week18": 2391.667558326072,"SWIR2week20": 2977.71718115419,
  },
  "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": "96.18 %",
        "Area": 125.17600246345707,
        "AreaPercent": "100 %",
        "AreaUnit": "ac",
        "Count": 2544,
        "CountAllPixels": 2645,
        "CropID": 4,
        "CropName": "WHEAT_HRD_RD_SPR",
        "color": "#9d250e"
    }],
     "pngb64":
     "data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAFsAAAAkCAYAAADmQkaNAAABCkl
     EQVR4nO3Xuw3CMBSFq="
  }
}
```

GET Request

Request Example

The GET request to retrieve the tif image using the file name from the POST response.

```
https://ag-analytics.azure-api.net/crop-identification-model/?filename= result_
cropidraster_20191126_183736_ 2356.tif
```

Request Parameters

Parameter	Data Type	Required?	Default	Options	Description
filetype	text	Yes	--	.tif file	file name returned by POST request

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.

CropIDs and Crop Names

Crop ID	Crop Name	Crop ID	Crop Name	Crop ID	Crop Name
36	Alfalfa	236	DblCropWinWht/Sorghum	77	Pears
75	Almonds	26	DblCropWinWht/Soybeans	53	Peas
68	Apples	141	DeciduousForest	74	Pecans
223	Apricots	82	Developed	216	Peppers
92	Aquaculture	124	Developed/HighIntensity	112	PerennialIce/Snow
207	Asparagus	122	Developed/LowIntensity	204	Pistachios
21	Barley	123	Developed/MedIntensity	220	Plums
65	Barren	121	Developed/OpenSpace	217	Pomegranates
131	Barren	42	DryBeans	13	PoporOrnCorn
242	Blueberries	22	DurumWheat	43	Potatoes
214	Broccoli	248	Eggplants	210	Prunes
39	Buckwheat	142	EvergreenForest	229	Pumpkins

243	Cabbage	61	Fallow/IdleCropland	246	Radishes
38	Camelina	32	Flaxseed	34	RapeSeed
55	Caneberries	63	Forest	3	Rice
31	Canola	208	Garlic	27	Rye
209	Cantaloupes	249	Gourds	33	Safflower
206	Carrots	69	Grapes	64	Shrubland
244	Cauliflower	176	Grassland/Pasture	152	Shrubland
245	Celery	219	Greens	59	Sod/GrassSeed
66	Cherries	195	HerbaceousWetlands	4	Sorghum
51	ChickPeas	57	Herbs	5	Soybeans
70	ChristmasTrees	213	HoneydewMelons	30	Speltz
72	Citrus	56	Hops	23	SpringWheat
81	Clouds/NoData	52	Lentils	222	Squash
58	Clover/Wildflowers	227	Lettuce	221	Strawberries
1	Corn	29	Millet	41	Sugarbeets
2	Cotton	14	Mint	45	Sugarcane
250	Cranberries	47	MiscVegs&Fruits	6	Sunflower
50	Cucumbers	143	MixedForest	12	SweetCorn
237	DblCropBarley/Corn	35	Mustard	46	SweetPotatoes
235	DblCropBarley/Sorghum	218	Nectarines	60	Switchgrass
254	DblCropBarley/Soybeans	88	Nonag/Undefined	11	Tobacco
241	DblCropCorn/Soybeans	28	Oats	54	Tomatoes
234	DblCropDurumWht/Sorghum	211	Olives	205	Triticale
233	DblCropLettuce/Barley	49	Onions	247	Turnips
231	DblCropLettuce/Cantaloupe	111	OpenWater	224	Vetch
232	DblCropLettuce/Cotton	212	Oranges	76	Walnuts
230	DblCropLettuce/DurumWht	44	OtherCrops	83	Water
226	DblCropOats/Corn	37	OtherHay/NonAlfalfa	48	Watermelons
239	DblCropSoybeans/Cotton	25	OtherSmallGrains	87	Wetlands
240	DblCropSoybeans/Oats	71	OtherTreeCrops	24	WinterWheat
225	DblCropWinWht/Corn	67	Peaches	190	WoodyWetlands
238	DblCropWinWht/Cotton	10	Peanuts		

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