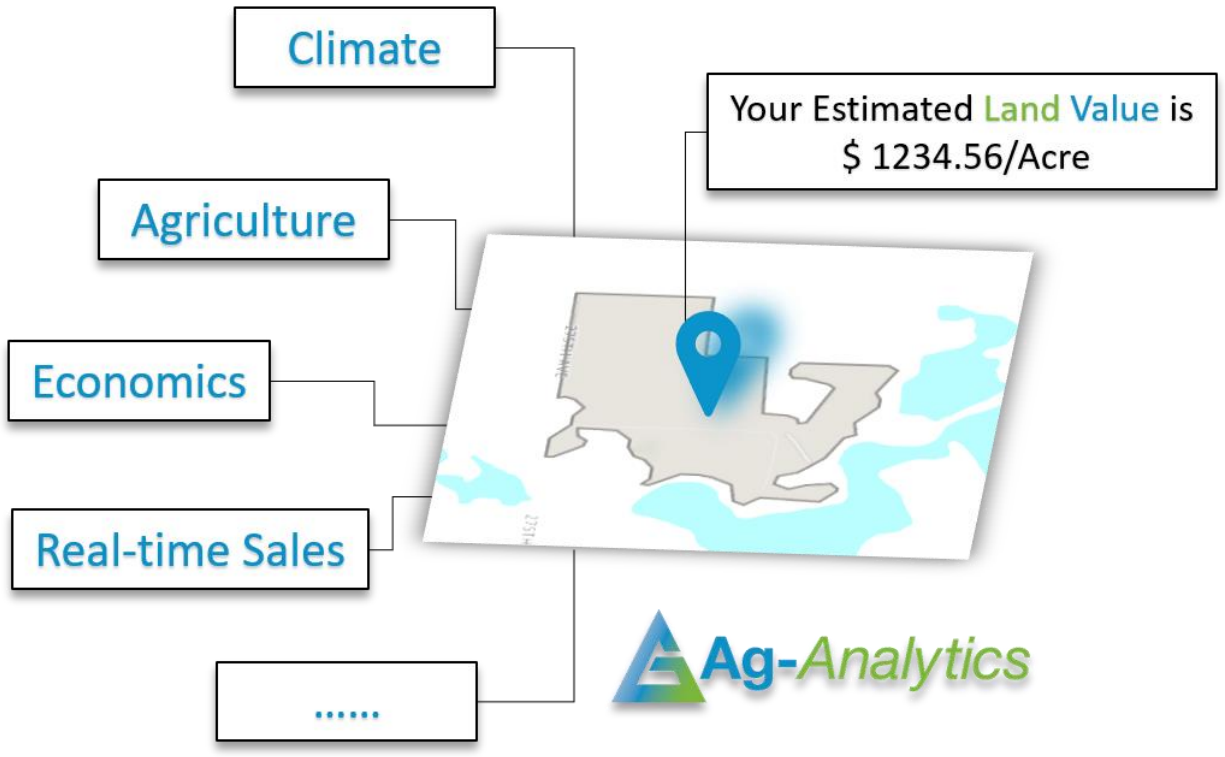
Land Value AI[BETA]

API Documentation
2020

Service Overview

The Ag-Analytics® Land Value AI provides timely and accurate estimation of any given parcel on any specific day. The current version of Land Value has two types of estimations: Auto Comps takes the comparables referring to properties with characteristics that are similar to the target parcel whose value is being estimated. AI models were trained on the real historical and near-real-time climate, agriculture, and economic data. It provides a science-based and big-data-based estimations on the parcel value.



Model Specifications

The real farmland sales information which both estimations – Auto Comps and AI Models of the Land Value AI are developed upon is powered by FarmlandFinder. Besides the real-time parcel sales information, AL models take three factors into the model training which are Climate, agriculture data, and the most up to date economic data.

AI Model Data Overview

Factor	Variables	Data Retrieved Time	Description
Sales	Location	NA	Location is critical in the parcel/land value estimation. Farmlands sold in Florida may have quite different prices as farmlands in Minnesota.
	Area	NA	
	Price	NA	
Climate	PRISM	Monthly Average of 30 years	The local climate may also affect the farmland basic characteristics which largely determine that land values. PRISM provides the monthly average temperature and precipitation in the past 30 years by the sold year. CMIP5Climate provides the projection weather in 2050 and 2070.
	CMIP5Climate	Monthly Average in 2050, and 2070	
Agriculture	CDL	The past 5 years	Crop rotation, productivity indexes, and elevation are the most important characteristics of the farmland parcels. The variables in this category reflect the productivity and fertility of the parcels. For example, National Commodity Crop Productivity Index (NCCPI) indicates the productivity of the soil. The source of Elevation is from USGS 10-meter Digital Elevation Model. Associated Elevation/ Topology indexes are calculated with Ag-Analytics Elevation Index API. These indexes provide the local elevation variance.(For further description of the DEM Service API and Elevation Index API, please check out Ag-Analytics API developer portal.)
	Soil pH	NA	
	National Commodity Crop Productivity Index (NCCPI)	NA	
	Elevation and Indexes	NA	
Economics	Treasury	One year after sale year	Land value is largely influenced by the market. For example, if the next year's corn futures settlement price is higher than it in last month, then the corn price is expected to be higher next year. It is likely to make the corn farmland price higher compared to the price of this farmland last month.
	Commodity futures	One year after sale year	
	Federal Interests Rate	One year after sale year	

Auto Comps Overview

Comparables(Comps) is the term used on real estate appraisal. It refers to the properties within certain query criteria that have similar characteristics to the target property whose value is being sought. Auto Comps in Ag-Analytics® Land Value AI is based on near real-time farmland sales information. It will automatically match the properties having similar geographical and temporal characteristics with the target land/parcel. Geographically, the Auto Comps will only get the lands/parcels located within a certain distance and filter out the lands/parcels that are far away from the target. After applied the geographic filter, Auto Comps will generate a 180-day searching window as the temporal filter which is based on the expected sale date user passed in. Then The temporal filter will exclude any lands/parcel with listing/sold time are not in this 180-day window. The unit of results is $/acre. The results will be grouped by sale condition which is either 'Sold' or 'For Sale'. Additional statistical information of the price is also provided in the results.

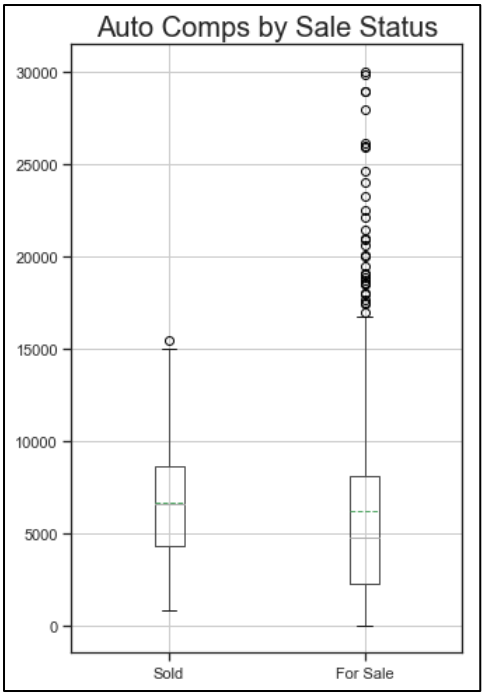


Figure 1 Auto Comps Results Boxplot

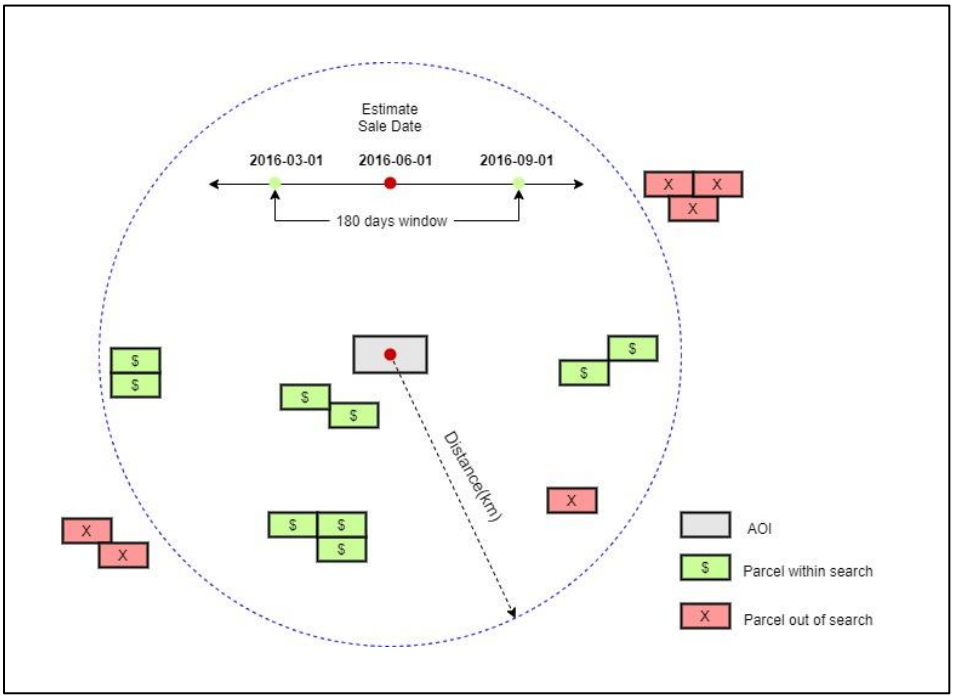


Figure 2 Illustration of Auto Comps Filters

POST Request

API: Here

Header Parameters
Execute Type: POST
content-type: "application/json"

API Specifications

Request Parameters

Parameter	Data Type	Required?	Default	Options	Description
aoi	GeoJSON in string	Yes	-	-	Geometry of area of Interest in GeoJSON format. Need to be passed into the API as string
model	String	No	Linear	'Linear', 'Tree', 'RF', 'Auto'	Model options: Linear: Multiple Linear Regression Tree: Decision Tree Regression RF: Random Forest Regression Auto: Auto Comps
Sale_Date	String	Yes	-	-	Expected sale date in 'yyyy-mm-dd' format. EX: '2020-04-20'

Response Parameters

Parameter	Type	Description
Model	String	Model name of Land Value. 'Auto'
status	String	Status of the API call. 'SUCCESS' or 'FAILED'
msg	String	The error message when API call failed
Result	Dictionary/float	Result of the Land value AI. In Auto Comps, the Result is a dictionary. The results will be grouped by sale condition: 'Sold' or 'For Sale'
Parameters in Result		
Parcel_Area	Float	Parcel area in acreage.
Total_Price	Float	Total estimated price of the entire parcel
Sale_Date	String	Estimated sale date. User specified
Unit	String	Unit of price. Currently default as us dollars
Price_Acre	Float	AI Estimated Price per acre
Percentile_10*	Float	The 10% percentile price per acre in the Auto Comps searching scope from low to high
Percentile_90*	Float	The 90% percentile price per acre in the Auto Comps searching scope from low to high
avg_price*	Float	Average price per acre in the Auto Comps searching scope
max_price*	Float	Highest price per acre in the Auto Comps searching scope
min_price*	Float	Lowest price per acre in the Auto Comps searching scope
num_list*	Integer	Number of comparables within the Auto Comps searching scope

Note: Parameters with * are results in Auto Comps model

Appendix

Figure 1.

Shape Example - GeoJSON

```
"{\"type\":\"Feature\",\"properties\":{},\"geometry\":{\"type\":\"Polygon\",\"coor
dinates\":[[[-95.84165811538698,46.30405964827517],[-
95.84174394607544,46.29697349504195],[-95.83659410476686,46.29691419281915],[-
95.83655118942261,46.29814470078284],[-95.83831071853638,46.29817435123596],[-
95.83837509155275,46.3029330408763],[-95.83831071853638,46.30303680831659],[-
95.83801031112672,46.30296268873647],[-95.837699174881,46.30297010069899],[-
95.83699107170106,46.30349634747375],[-95.83695888519289,46.30367423256352],[-
95.8370339870453,46.30393364728336],[-95.83717346191408,46.3040003537269],[-
95.8375597000122,46.30405223646016],[-95.8375597000122,46.30318504717584],[-
95.84077835083009,46.30317022330798],[-95.84081053733827,46.30408188371422],[-
95.84165811538698,46.30405964827517]]]}}"
```

Figure 2

Request Example – application/json

```
application/json
{'aoi':
'{"type":"Feature","properties":{},"geometry":{"type":"Polygon","coordinates":[[[
-95.84165811538698,46.30405964827517],[-95.84174394607544,46.29697349504195],[-
95.83659410476686,46.29691419281915],[-95.83655118942261,46.29814470078284],[-
95.83831071853638,46.29817435123596],[-95.83837509155275,46.3029330408763],[-
95.83831071853638,46.30303680831659],[-95.83801031112672,46.30296268873647],[-
95.837699174881,46.30297010069899],[-95.83699107170106,46.30349634747375],[-
95.83695888519289,46.30367423256352],[-95.8370339870453,46.30393364728336],[-
95.83717346191408,46.3040003537269],[-95.8375597000122,46.30405223646016],[-
95.8375597000122,46.30318504717584],[-95.84077835083009,46.30317022330798],[-
95.84081053733827,46.30408188371422],[-95.84165811538698,46.30405964827517]]]}}',
 'model': 'Auto',
 'Sale_Date': '2020-04-15'}
```

Figure 3

Response – application/json


```
{
  "Model": "Auto",
  "Result": {
    "For Sale": {
      "Percentile_10": 1285.0,
      "Percentile_90": 13255.0,
      "avg_price": 4792.197782389308399065,
      "max_price": 895000.0000,
      "min_price": 26.0000,
      "num_list": 811
    },
    "Parcel_Area": 51.74941101442054,
    "Sold": {
      "Percentile_10": 3549.0,
      "Percentile_90": 11100.0,
      "avg_price": 6879.141775894334,
      "max_price": 69371.0,
      "min_price": 792.0,
      "num_list": 318
    },
    "Unit": "$",
    "Sale_Date": "2020-04-15"
  },
  "status": "SUCCESS"
}
```


Figure 4

Response – application/json


```
'{
  "Result": {
    "Model": "RF",
    "Parcel_Area": 51.74941101442054,
    "Price_Acre": 10520.09,
    "Sale_Date": "2020-04-15",
    "Total_Price": 544408.4613186953,
    "Unit": "$"
  },
  "status": "SUCCESS"
}'
```

Spatial Reference Information:

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

Please contact **support@analytics.ag**, **josh@ag-analytics.org**, or **woodardjoshua@gmail.com** with any comments or questions.