The Cotton Classing Data Import Plugin for ADAPT

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Contents

Purpose

The purpose of this plugin is to import information from the USDA cotton classing data file into the ADAPT data model. The ADAPT data model acts as a universal agricultural lexicon for ag data. Once data is in the ADAPT data model, you can leverage this format for easy interoperability into other formats that share communication between their format and the ADAPT data format. This allows for multiple input and output formats to be interoperable with each other within the agriculture community.

Cotton represents a special case that is unique to agricultural commodities in that the fiber quality data is electronically transmitted back to the gin after harvest and no system currently exists to seamlessly relate the field data (harvest GPS coordinates, variety, yield, moisture content at harvest) with the fiber quality data.

The ADAPT initiative was designed for this reason, so that all the Agricultural data formats around the world can coexist in an agreed upon data format. Getting your data into the ADAPT data model means you are one step closer to being exported into another Ag related information system, and one step closer to better information results.

Audience

The recommended audience for the cotton classing ADAPT plugin are individuals who are familiar with cotton classing data, as well as those familiar with or interested in ADAPT formatted data. The USDA Cotton Classing database produces a flat file that serves as the expected input for this plugin. Individuals using this plugin can find the information related to the flat file layout in the architecture section of this document.

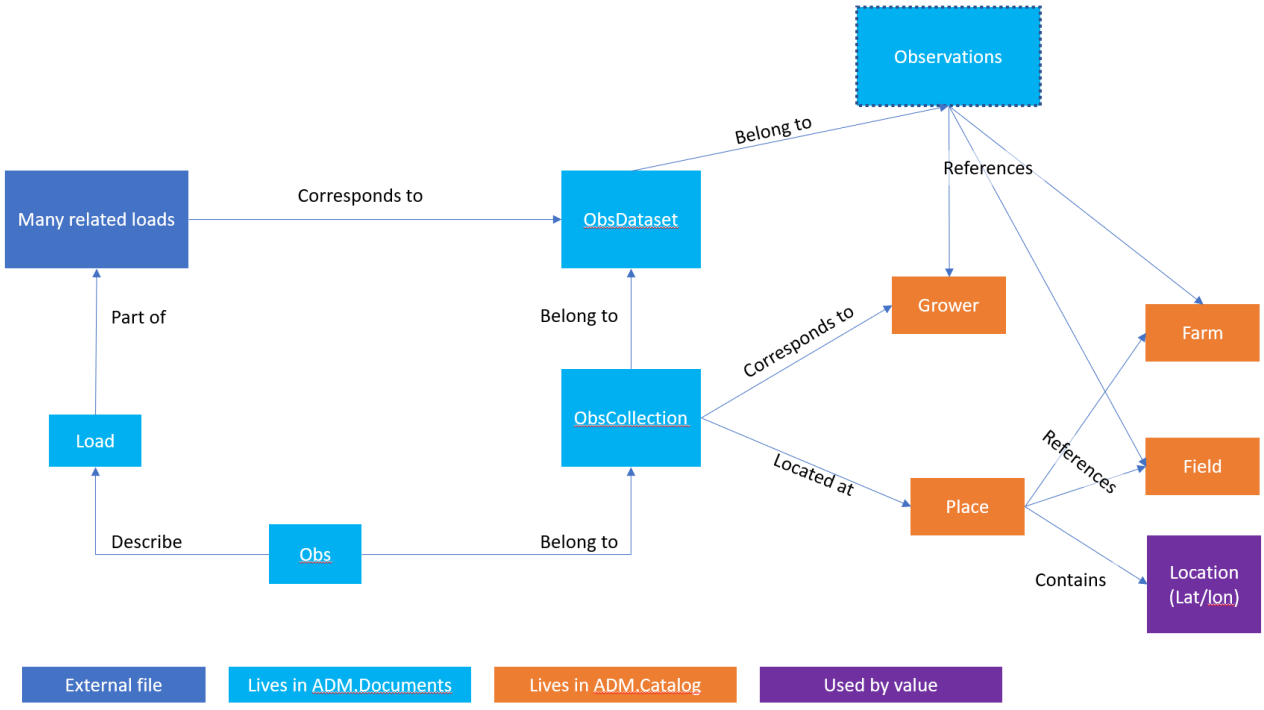
Finally, developers who are interested in using this plugin and modifying it must be familiar with the technologies in the next section.

Development Requirements

The ADAPT data model is written in C#, and this plugin is written in C#. Developers interested in using and modifying this plugin must be proficient in C#. Additionally, developers must have a proficient understanding of modern object-oriented programming techniques. Anyone interested in learning the ADAPT framework can find valuable resources including video tutorials at the ADAPTFramework.org website.

Architecture

During the import process, the cotton plugin converts the data from flat file to a basic object model. After converting the information into a model in memory, the plugin creates an ADAPT document object, and loops through each individual record (considered a load), creating a set of observations and observation collections for that unique load.



Cotton Keys

The following cotton keys were required for this ADAPT import implementation in order to create valuable observation metrics that can be reported on:

Observations:

Name	Description	Class	Comments	Data Type	Example
A_YLD_USDA_1GOSG_OFFICIAL_COLOR_GRADE	The color grade of the cotton sample.	Obs	Columns 29-30 in USDA record.	Integer	96 (Mixture of upland and pima)
A_YLD_USDA_1GOSG_STAPLE_LENGTH	Fiber length expressed in 32nds of an inch.	Obs	Columns 31-32 in USDA record.	Integer	30 (0.93-0.95 inch for upland cotton)
A_YLD_USDA_1GOSG_MICRONAIRE	Cotton's resistance to air flow per unit mass is measured to determine micronaire. Micronaire is a measure of the cotton's fineness and is reported to the nearest tenth. Micronaire and maturity are highly correlated within a cotton variety.	Obs	Columns 33-34 in USDA record.	Decimal	4.3

A_YLD_USDA_1GOSG_STRENGTH	The fiber strength measurement is made by clamping and breaking a bundle of fibers with a 1/8-inch spacing between the clamp jaws. Results are reported in terms of grams per tex to the nearest tenth. A tex unit is equal to the weight in grams of 1,000 meters of fiber. Therefore, the strength reported is the force in grams required to break a bundle of fibers one tex unit in size.	Obs	Columns 35-37 in USDA record.	Decimal	23.7
A_YLD_USDA_1GOSG_LEAF_GRADE	Leaf refers to particles of the cotton plant's leaf which remain in the lint after the ginning process. Upland leaf grades are determined by the HVI instrument based measurements of Percent Area (columns 52-53) and Particle Count (not a reported classification measurement) and are identified as numbers 1 through 7, all represented by physical standards. Upland leaf grade 8 (Below Grade) is used to identify samples having more leaf than leaf grade 7. American Pima leaf grades are also determined by the HVI and are identified as numbers 1 through 6, all represented by physical standards, and leaf grade 7 (Below Grade), which is used to describe samples having more leaf than leaf grade 6.	Obs	Column 38 in USDA record.	Integer	

A_YLD_USDA_1GOSG_EXTRANEOUS_MATTER	Extraneous matter is any substance in the cotton other than fiber or leaf.	Obs	Columns 39-40 in USDA record.	Enumeration	12 (Bark level 2)
A_YLD_USDA_1GOSG_HVI_COLOR_GRADE	The same color grade as the official color grade.	Obs	Columns 43-44 in USDA record.	Integer	

A_YLD_USDA_1GOSG_HVI_COLOR_QUADRANT	Color grade subdivisions are reported as Color Quadrants.	Obs	Column 45 in USDA record.	Integer	
A_YLD_USDA_1GOSG_HVI_REFLECTANCE	HVI Rd (% reflectance)	Obs	Columns 46-48 in USDA record.	Decimal	

A_YLD_USDA_1GOSG_HVI_YELLOWNESS	HVI +b (yellowness)	Obs	Columns 49-51 in USDA record.	Decimal	
A_YLD_USDA_1GOSG_TRASH_PERCENT_AREA	The two-digit trash percent area reported on the classification record is the percent of the sample surface covered by trash particles as determined by the instrument to the nearest tenth. Trash particles include extraneous matter such as grass, bark, etc., but these particles cannot be distinguished one from another by this measurement.	Obs	Columns 52-53 in USDA record.	Decimal	

A_YLD_FIBER_LENGTH	Fiber length expressed in 100ths. of an inch.	Obs	Columns 54-56 in USDA record.	Decimal	
A_YLD_USDA_1GOSG_LENGTH_UNIFORMITY_INDEX	Length uniformity is the ratio between the mean length and the upperhalf mean length of the fibers, expressed as a percentage. If all of the fibers in the bale were the same length, the mean length and the upperhalf mean length would be the same, and the uniformity would be 100 percent. However, because of natural variation in the length of cotton fibers, length uniformity will always be less than 100 percent.	Obs	Columns 57-59 in USDA record.	String	

CC_FOI_CROP	This one-digit code indicates whether the sample is Upland or American Pima. 1 = Upland 2 = Pima	Code Component on Obs Collection	Column 60 in USDA record.		If 1, then Value = GOSHI; if 2, value = GOSBA
US_USDA_1GOSG_REMARKS	The instrument assigns the remarks code 75 where applicable. Classers identify other special conditions that may cause processing problems and lower yarn quality. The following remarks codes identify special condition cotton: 75 Other Side Two or More Color Grades and/or Color Groups or One Color Grade and One Color Group Higher 76 Reginned 77 Repacked 78 Redder Than Normal (Pima) 92 Pima Ginned on Saw Gin	Obs	Columns 41-42 in USDA record.	Enumeration	76 (Reginned)

US_USDA_1GOSG_RECORD_TYPE	This one-digit code indicates the type of record, as follows: 0 = Original 1 = Review 2 = Rework	Code Component on Obs Collection	Column 61 in USDA record.	Enumeration	
US_USDA_1GOSG_RECORD_STATUS	Record Status (Column 62): This one-digit code indicates whether or not the manual classing information has been corrected: 0 = Not a correction 1 = Correction	Code Component on Obs Collection	Column 62 in USDA record.		

Context Items:

US_USDA_1GOSG_GIN_CODE	First five digits of the permanent bale identification (PBI) tag number, that is not repeated in a 5-year period. The first two digits denote the Classing Office, and the last three digits identify the Gin.	integer
US_USDA_1GOSG_GIN_BALE_ID	last seven digits of the permanent bale identification (PBI) tag number. It is assigned by the gin.	integer
US_USDA_1GOSG_DATE_CLASSED	YYYYMMDD	datetime in ISO 8601 format
US_USDA_1GOSG_REPORTING_BASIS	This one-digit code indicates whether the sample was outturned as a single bale or as a bale that was module/trailer averaged. Single bale = 0 Module = 1 Trailer = 2 Detailed information on Module Averaging is shown on Appendix A (Source: USDA)	Enumerated context item
US_USDA_1GOSG_MODULE_TRAILER_NUMBER	This five-digit number identifies the module/trailer number assigned at the gin.	integer
US_USDA_1GOSG_NUMBER_OF_BALES	This two-digit number identifies the number of bales in the module/trailer that were released with the module average calculations.	integer
US_USDA_1GOSG_LOAN_PREMIUM	CCC Loan Premiums and Discounts (Columns 63-67): This five-digit code gives the CCC loan premium and discount points for Upland cotton. The physical loan price for Pima cotton is shown in cents per pound. Columns 63-67 will be left blank if the bale is not eligible for loan. Upland: Column 63 (+) if Premium, (-) if Discount	

Conclusion

This plugin is part of a larger project effort to unify data collected between the farm, field, gin and farm management information system for the cotton industry. This initiative also builds on an industry history of providing material property data to cotton textile customers. This is an ongoing digital transformation project for the cotton industry at large, unifying data collected throughout the cotton harvest and ginning process. Users of this plugin will benefit from the alignment of data from the cotton classing database with other information collected during the cotton harvest and refinement process and can utilize this information later in time during reporting and data analysis.

By leveraging ADAPT (with which farm management information systems (“FMIS”) companies have multiple motivations to integrate), FMIS can

provide growers with a user-friendly framework to evaluate and improve the sustainability of their operations.

A great deal of data is now automatically collected by agricultural and ginning machinery. Additionally, the ability to add automated measurement such as processing rate and energy use is possible with minimal costs and modification to the gin. There are also emerging needs to share data to support sustainability and traceability programs.

Cotton Incorporated has sponsored the development of this ADAPT “plug-in” for cotton classing data to make it easier for ag software providers to support cotton specific data.