Kaggle Model Executable Documentation

Deliverables

The model implementation consists of the following:

- Batch scripts
    - Predict-EagleFord-Oil.bat
    - Predict-EagleFord-Gas.bat
    - Predict-Marcellus-Gas.bat
- Model files in the Models subdirectory
    - EagleFordOil.zip
    - EagleFordGas.zip
    - MarcellusGas.zip
- Prediction executable with supporting libraries in the Predict subdirectory

Each of the above batch scripts is designed to take an input file with predefined set of columns and output P10, P50 and P90 estimates for each row in the input file. The specific columns required for each model are listed in this document. We have also included sample files in the directory with the appropriate column headers and a single row of values as an example.

Requirements
- Windows 7 or later
- .NET Framework 4.5 or later

Usage

The three batch files are called with two arguments from the Windows command line (Start -> Command Prompt):

- the path of the input file (which must exist); and
- the path of the desired output file.

Example:

```
C:\KaggleModels> Predict-EagleFord-Gas.bat EagleFordGasDataSample.csv
EFGasPredictions.csv
```

Once the program is run, it will load the input file and run each row through the appropriate model and store the results in the output file specified. The output file will pass through the latitude and longitude values, which can be used for plotting the results. The batch scripts themselves do not have charting capabilities.

If there are any errors in processing the input file, the program will terminate and provide the reason for the error.

Input Data Format

The input file must be a table of comma separated values (CSV), with a header row, and one well represented by each subsequent row. All rows must have the same number of fields. All text fields (including the header) must be enclosed in double quotes, Boolean fields must be TRUE or FALSE (unquoted), numeric fields are unquoted, and missing numeric fields are set to zero. Please use the sample input files to avoid any issues with the column headers.

We have added the description for certain fields if the name of the field can be ambiguous. Most of the properties listed below came directly from Core Labs or IHS so Kaggle does not have detailed description for all the features.

Please note that the field names have a suffix of Kriged, which is from Kaggle's internal data conversion process and it does not have any special interpretation. Also, the variable names for GRI properties were named with a sentence case (Gri) due to automatic conversion of variable names provided by a library to sentence case.

Eagle Ford Oil Model Input

Name	Type	Description
Uwi	Text	Unique Well Identifier
Latitude	Numeric	
Longitude	Numeric	
Core.BulkDensityDynamic.Kriged	Numeric	
Core.ConfiningStressDynamic.Kriged	Numeric	
Core.CsgThoriumApi.Kriged	Numeric	
Core.GriBulkDensity.Kriged	Numeric	
Core.GriCoreyTypeParameter.Kriged	Numeric	
Core.GriGasFilledPorosity.Kriged	Numeric	
Core.GriGrainDensity.Kriged	Numeric	
Core.GriMatrixPermeabilityAbsolute.Kriged	Numeric	
Core.GriSaturationSg.Kriged	Numeric	GRI Gas Saturation
Core.GriSaturationSo.Kriged	Numeric	GRI Oil Saturation
Core.GriTotalPorosity.Kriged	Numeric	
Core.GriWaterFilledPorosity.Kriged	Numeric	

Core.GscCombustibleGasContent.Kriged	Numeric	
Core.NormalizedOil.Kriged	Numeric	
Core.PoissonsRatioDynamic.Kriged	Numeric	
Core.RoCalculated.Kriged	Numeric	Calculated Vitrinite Reflectance
Core.RoMeasured.Kriged	Numeric	Measured Vitrinite Reflectance
Core.S1.Kriged	Numeric	Pyrolysis Volatile Hydrocarbon
Core.S2.Kriged	Numeric	Pyrolysis Thermogenic Hydrocarbon
Core.S3.Kriged	Numeric	Pyrolysis Carbon Dioxide
Core.ShearVelocityDynamic.Kriged	Numeric	
Core.StaticYoungsModulus.Kriged	Numeric	
Core.Tmax.Kriged	Numeric	Temperature of S2 peak
Core.Toc.Kriged	Numeric	Total Organic Carbon
Core.XrdClayChlorite.Kriged	Numeric	
Core.XrdClayIllite.Kriged	Numeric	
Core.XrdClayKaolinite.Kriged	Numeric	
Core.XrdDolomite.Kriged	Numeric	
Core.XrdMarcasite.Kriged	Numeric	
Core.XrdPlagioclase.Kriged	Numeric	
Producer.EstimatedLength.Joined	Numeric	Estimated horizontal length
Producer.DepthTrueVertical.Joined	Numeric	

Eagle Ford Gas Model Input

Name	Type	Description
Uwi	Text	Unique Well Identifier
Latitude	Numeric	
Longitude	Numeric	
Core.BulkDensityDynamic.Kriged	Numeric	
Core.ConfiningStressDynamic.Kriged	Numeric	
Core.CsgPotassiumApi.Kriged	Numeric	
Core.CsgThoriumApi.Kriged	Numeric	
Core.GriBulkDensity.Kriged	Numeric	
Core.GriCoreyTypeParameter.Kriged	Numeric	
Core.GriGasFilledPorosity.Kriged	Numeric	
Core.GriGrainDensity.Kriged	Numeric	
Core.GriMatrixPermeability.Kriged	Numeric	
Core.GriSaturationSg.Kriged	Numeric	GRI Gas Saturation
Core.GriSaturationSo.Kriged	Numeric	GRI Oil Saturation
Core.GriWaterFilledPorosity.Kriged	Numeric	
Core.GscCombustibleGasContent.Kriged	Numeric	
Core.NormalizedOil.Kriged	Numeric	
Core.PoissonsRatioDynamic.Kriged	Numeric	

Core.PoissonsRatioStatic.Kriged	Numeric	
Core.RoCalculated.Kriged	Numeric	Calculated Vitrinite Reflectance
Core.RoMeasured.Kriged	Numeric	Measured Vitrinite Reflectance
Core.S1.Kriged	Numeric	Pyrolysis Volatile Hydrocarbon
Core.ShearVelocityDynamic.Kriged	Numeric	
Core.StaticYoungsModulus.Kriged	Numeric	
Core.Tmax.Kriged	Numeric	Temperature of S2 peak
Core.Toc.Kriged	Numeric	Total Organic Carbon
Core.XrdClayChlorite.Kriged	Numeric	
Core.XrdClayIllite.Kriged	Numeric	
Core.XrdDolomite.Kriged	Numeric	
Core.XrdMarcasite.Kriged	Numeric	
Core.XrdPlagioclase.Kriged	Numeric	
Producer.DepthTrueVertical.Joined	Numeric	
Treatment.FluidAmountGallonsFracPerProppingAgentAmountPounds.Joined	Numeric	Ratio of fluid amount to propping agent amount, missing values are zero
Treatment.FluidAmountGallonsFracPerProppingAgentAmountPounds.JoinedMISSING	Boolean	True if the above feature is missing

Marcellus Gas Model Input

Name	Type	Description
Uwi	Text	Unique Well Identifier
Latitude	Numeric	
Longitude	Numeric	
Core.BulkDensityDynamic.Kriged	Numeric	
Core.CrushedGasContent.Kriged	Numeric	
Core.CsgPotassiumApi.Kriged	Numeric	
Core.CsgThoriumApi.Kriged	Numeric	
Core.CsgUraniumApi.Kriged	Numeric	
Core.GriBulkDensity.Kriged	Numeric	
Core.GriGasFilledPorosity.Kriged	Numeric	
Core.GriMatrixPermeability.Kriged	Numeric	
Core.GriSaturationSg.Kriged	Numeric	GRI Gas Saturation
Core.GriSaturationSw.Kriged	Numeric	GRI Water Saturation
Core.GriTotalPorosity.Kriged	Numeric	
Core.GriWaterFilledPorosity.Kriged	Numeric	
Core.NormalizedOil.Kriged	Numeric	
Core.RoCalculated.Kriged	Numeric	Calculated Vitrinite Reflectance
Core.RoMeasured.Kriged	Numeric	Measured Vitrinite Reflectance
Core.S1.Kriged	Numeric	Pyrolysis Volatile Hydrocarbon
Core.ShearVelocityDynamic.Kriged	Numeric	
Core.Toc.Kriged	Numeric	Total Organic Carbon
Core.XrdCalcite.Kriged	Numeric	
Core.XrdClayChlorite.Kriged	Numeric	

Core.XrdClayIllite.Kriged	Numeric	
Core.XrdDolomite.Kriged	Numeric	
Core.XrdMarcasite.Kriged	Numeric	
Core.XrdQuartz.Kriged	Numeric	
Core.XrdTotalClay.Kriged	Numeric	
Log.DPHI.Kriged	Numeric	Logged Density Porosity
Log.GR.Kriged	Numeric	Logged Gamma Rays
Log.NPHI.Kriged	Numeric	Logged Neutron Porosity
Producer.DepthTrueVertical.Joined	Numeric	Zero if missing
Producer.DepthTrueVertical.JoinedMISSING	Boolean	True if DepthTrueVertical is missing

Example Output Layout for All Models

When a batch script finishes without any errors, it will output the results in the following format.

Name	Type	Description
Uwi	Text	Unique Well Identifier that was provided in the input file
Latitude	Numeric	Latitude that was provided in the input file
Longitude	Numeric	Longitude that was provided in the input file
Production.P10	Numeric	P10 production prediction from the model
Production.P50	Numeric	P50 production prediction from the model
Production.P90	Numeric	P90 production prediction from the model