**IBM Cloud**

**Predicting Customer Churn**

Watson Data Platform

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**Lab Guide**

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# Lab Environment Overview

**Software and Tools**

|  |  |
| --- | --- |
| **Software** | **Link** |
| **IBM Data Science Experience (DSX)** | https://datascience.ibm.com/ |
| **GitHub** | https://github.com/team-wolfpack |

# Lesson 1: DSX Signup & Home Page

|  |  |
| --- | --- |
| Purpose: | This lab introduces DSX, its sign up and walk-through of the features and functions starting at the Home Page. |
|  |  |
| Tasks: | Tasks you will complete in this lab exercise include:   * Create/Sign-In to DSX Account * Engage Live Chat * Differentiate Four Types of Community Cards * Explore Personal Profile, Apps/Services, and Integrations |

## Lesson 1: Workflow Overview

## Lesson 1: Instructions

| Action |
| --- |
| **1. Create Account/Sign In to DSX**   * Open web browser and navigate to: **https://datascience.ibm.com**   J:\Projects\DSX Hands-on Lab\Images\Picture1.jpg   * Click on “Sign Up” and you will be prompted for several items of information. After a few moments of self-configuration, you will be brought to your new Home Page:     **2. Live Chat**  This is the home page of IBM Data Science Experience(DSX). Here you have all the tools that you need in a single place to **Learn, Create, and Collaborate**.   * On the bottom right-hand corner, you will see a **Live Chat** feature. Click on the **Chat** icon to launch Live Chat:       If you need assistance, you need only click on **New Conversation** to connect with a live person. Through this Live Chat feature, you can also continue conversations the next time you log into DSX.  We use feedback captured through **Live Chat** and the offerings instrumentation to guide our decisions in designing and developing **Data Science Experience**. We perform this analysis using DSX.  **3. Community Cards**  At the top of the Home Page click on **Community Cards**:  A screenshot of a cell phone  Description generated with very high confidence  There are four types of cards – **Articles, Data Sets, Notebooks, and Tutorials**. These are designed to make it easier for you to learn about data science and experiment with its various tools and techniques.  **4. Profile Settings**   * Click on **Settings** to look at your **Profile, Apps and Services, and Integrations**. This is where you see the details of your Bluemix Account:   A screenshot of a cell phone  Description generated with very high confidence  **5. Apps and Services**   * Click on **Apps and Services** to view all your current IBM Cloud Apps and Services:     Above is the default for the brand-new account, there are no services or apps deployed.  **Integrations** is where you configure DSX for GitHub integration.  **End of Lesson 1** |

# Lesson 2: Jupyter Notebook

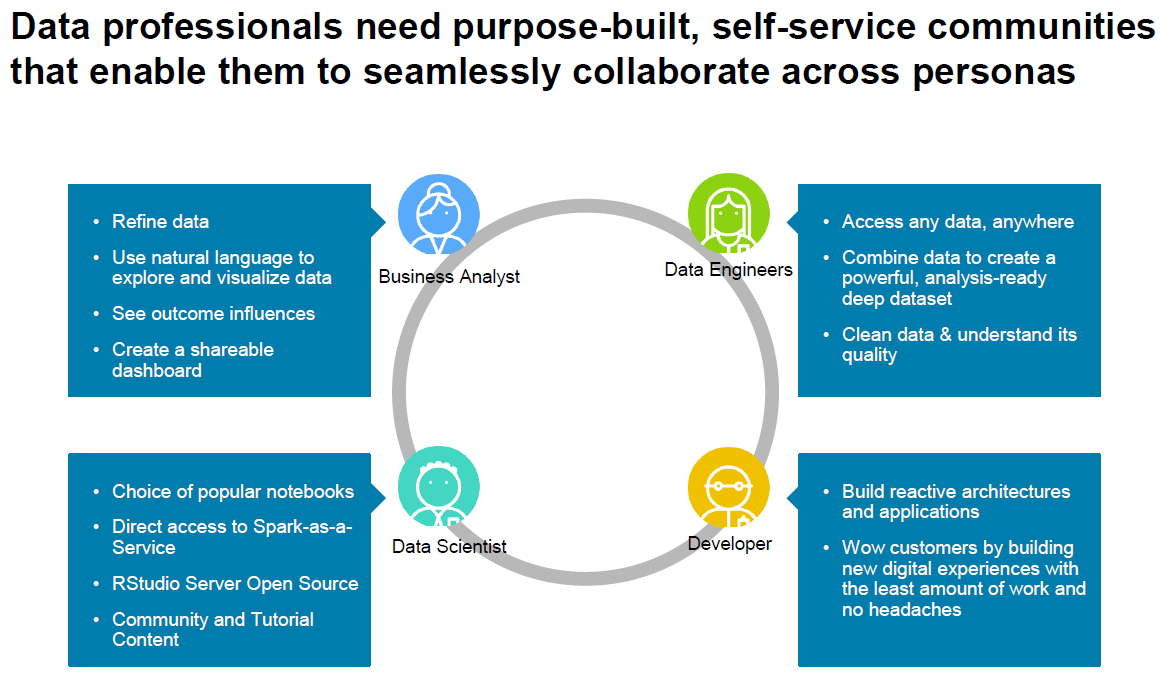
|  |  |
| --- | --- |
| Purpose: | This lesson introduces projects within DSX, their purpose, value, and how they are used to support collaboration. Also, Jupyter notebooks are introduced and used as part of a customer churn analysis using Spark. |
|  |  |
| Tasks: | Tasks you will complete in this lab exercise include:   * Create and Configure DSX Project * Add Notebook Asset * Retrieve Data from External Repository * Predict Customer Churn using Machine Learning Techniques * Evaluate Model Performance |

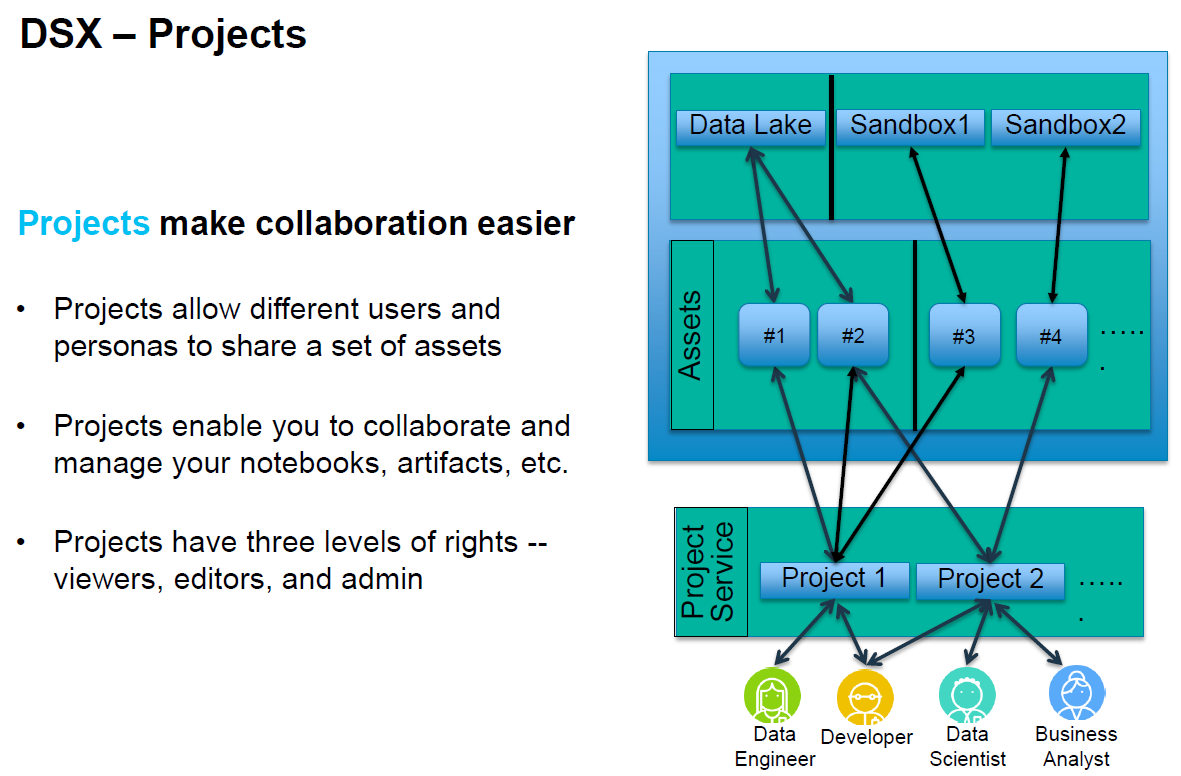
## Lesson 2: Workflow Overview

## Lesson 2: Instructions

**1. Project Overview**

Data professionals need purpose-built, self-service communities that enable them to seamlessly collaborate across personas.





**Projects** make collaboration easier by:

* Allowing different users and personas to share a set of assets
* Enabling users to collaborate and manage their notebooks, artifacts, plus more
* Providing three levels of rights: Viewers, Editors, and Admins

| Action |
| --- |
| **2. Create New Project**   * Navigate to **https://datascience.ibm.com** * Login to DSX * On the top right side, click **Create New and select project**      * Type the Project Name **Customer Churn,** add a meaningful description:     Define Storage:   * Select **Object IBM Cloud Storage** * Click Add * Choose “Lite” plan then “Create” * Verify your options then “Confirm”   Define Compute Engine:   * Under “Select Spark Service” click on “Add” * Choose “Lite” plan then “Create” * Verify your options then “Confirm”      * Click **Create**     You now have a **Project** that is empty. You can use the tabs along the top to **add assets** to your project such as Connections, Notebooks, Data Assets, etc. You can also **add collaborators** to the Project. |

|  |
| --- |
| **3. Create Notebook**   * Click **Assets,** then **Add Notebooks**      * Choose **From URL** from the tab, give the notebook a name and meaningful description:      * In a separate browser window navigate to:   [Predicting Customer Churn with Watson Data Platform](https://github.com/team-wolfpack/Predicting-Customer-Churn-with-Watson-Data-Platform)  (https://github.com/team-wolfpack/Predicting-Customer-Churn-with-Watson-Data-Platform)   * Click on Notebooks, right click on **CustomerChurn-PySpark.ipynb** then choose **Copy link address**. Go back to the **DSX New Notebook** page.   Paste URL into **Notebook URL** text box then choose **Create Notebook**:    You should now see:    **Lesson 2 Continued in [Customer Churn – PySpark] Notebook** |

# Lesson 3: Machine Learning Flows

|  |  |
| --- | --- |
| Purpose: | This lesson introduces Machine Learning Flows in DSX. Flows provide a graphical approach to machine learning like that of SPSS Modeler. |
|  |  |
| Tasks: | Tasks you will complete in this lab exercise include:   * Create Machine Learning Flow * Import Data * Leverage Flows’ Palette to Orchestrate Customer Churn Machine Learning Pipeline * Evaluate Customer Churn Model |

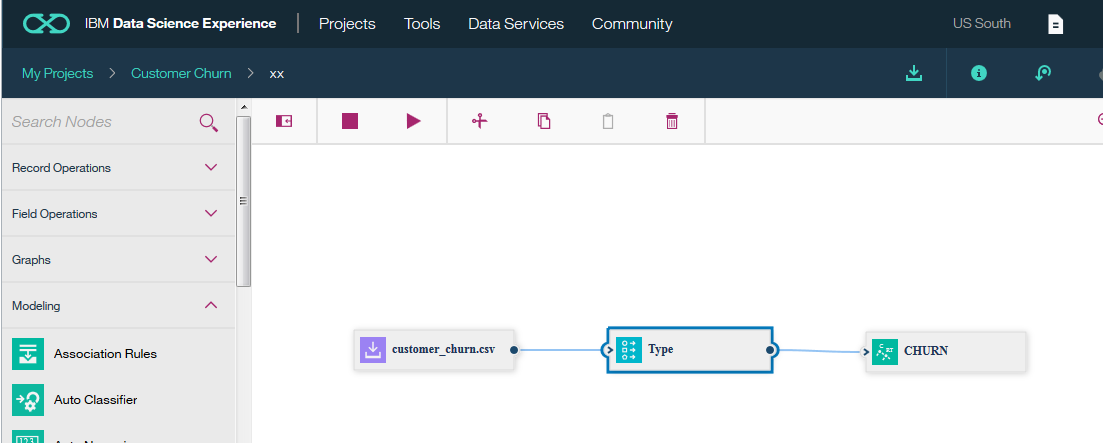
## Lesson 3: Workflow Overview

## Lesson 3: Instructions

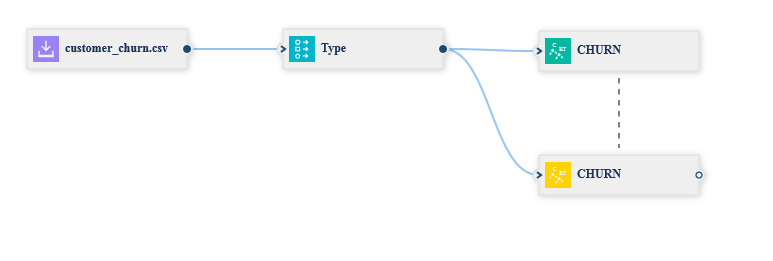
| Action |
| --- |
| **1. Load Data from Local File**   * In a separate browser navigate to: [Customer Churn Data](https://github.com/team-wolfpack/Predicting-Customer-Churn-with-Watson-Data-Platform/tree/master/Data):   https://github.com/team-wolfpack/Predicting-Customer-Churn-with-Watson-Data-Platform/tree/master/Data   * Download **customer\_churn\_data.zip** file, unzip and place customer\_churn.csv in a folder on your computer. * Go back to the Customer Churn project and then click on the Data icon at the top right of the screen:   A new panel will be presented with Files highlighted. Click on browse, navigate to the customer\_churn.csv file and select it. You should now see that the file has been imported into the project:    Navigate back to “Assets” and see the new “Data Asset”:    **2. Create Machine Learning Flow**   * Navigate to CustomerChurn project page * Click on “**New machine learning flow**”      * Choose “**Create flow**” on the top menu. Give the flow a meaningful name and description. For “Runtime” choose “**IBM SPSS Modeler**”:      * Click on “Create Flow” |
| **3. Add Data Asset**  You should now see an empty workspace.   * On the top left click on the “Palette” icon, and on the top right click on the “**Find and Add Data**” icon.     The palette represents the set of tools available for use with DSX flows. The menu of the right should look familiar.   * Let’s start by dragging and dropping the “**customer\_churn.csv**” file onto the workspace.   **3. Add & Configure Type Object**   * From the palette, expand “**Field Operations**”, then drag and drop “**Type**” onto the workspace and to the right of “customer\_churn.csv. Connect the two objects:      * Double click on “Type”, click on “**Configure Types**” then “**Add Columns**” * Add all the columns except for “ID”.      * Click on “Select Fields for Type” back arrow * For the “CHURN” column, change its Role to that of “**Target.”** Leave the default for the remaining columns:        * Click “OK”, then “Save” to exit.   **4. Add & Configure Model Object**   * From the palette, expand the “**Modeling**” branch then drag “**C&R Tree**” onto the workspace to the right of “Type.” * Connect the two then double click on “C&R Tree” to edit its properties. * The C&R Tree object should now say “CHURN”. Double click on this object. * Click on “FIELDS”, Target should be set to “CHURN”      * Click on “Add Columns.” Recall from the notebook exercise you were asked to jot down the top 5 fields that were identified as the greatest influencers. Choose those columns as inputs to the decision tree model. Click “OK” to return to the workspace: * Click on “Select Fields for CHURN” back arrow then “Save.” * Your palette should resemble this: |

**5. Run Flow to Create Nugget**

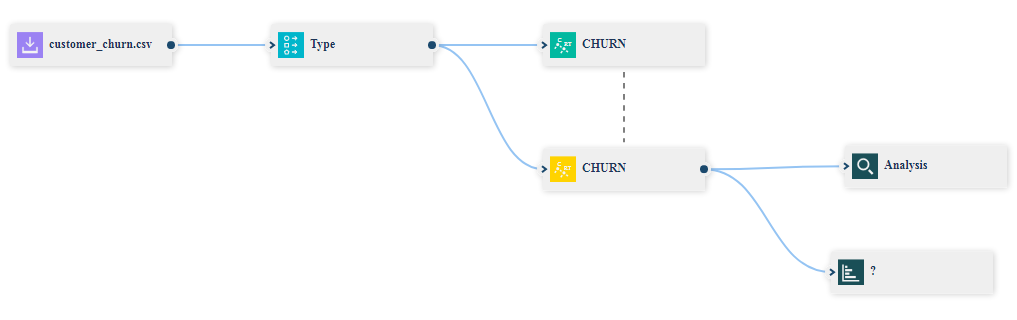
* Run the flow by clicking on the “Run” icon at the top of the workspace.



You should see a new forth object on the workspace, this is called a nugget.

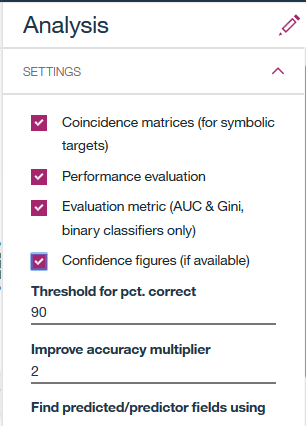


* From the palette add an “**Analysis**” object to the workspace, you will find it under the “Outputs” drop down. Also, from the “**Graphs**” drop down add a “**Distribution**” object to the workspace. Connect the nugget to each of them:

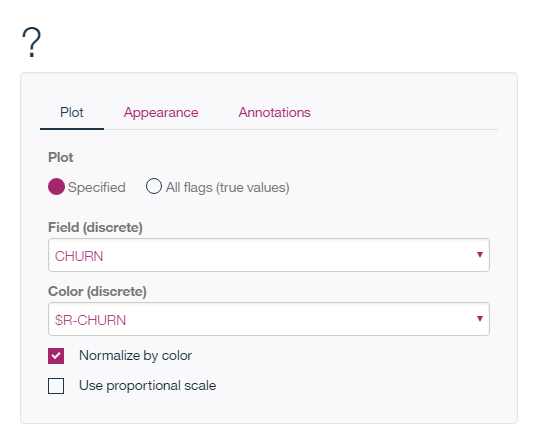


**6. Add & Configure Analysis Object – Measure Model Performance**

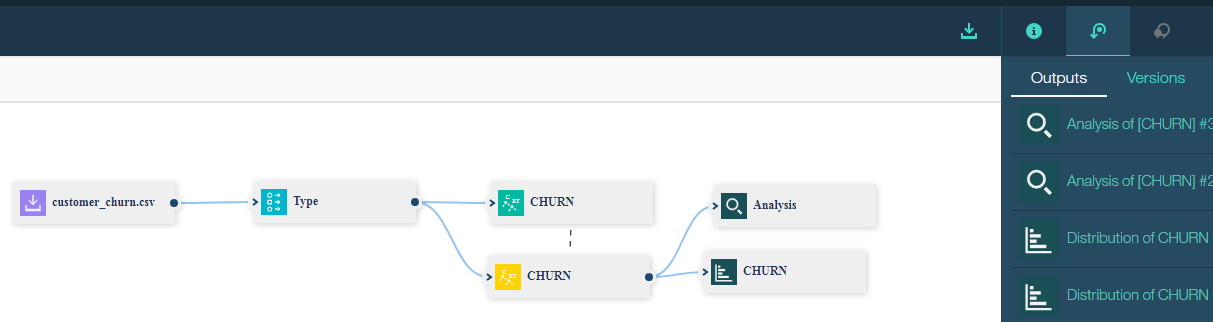
* Double click on “**Analysis**” and check off the four checkboxes, leave the rest as default:



* Click “OK” to return to the workspace.
* Double click on “Plot” and configure it as depicted below:



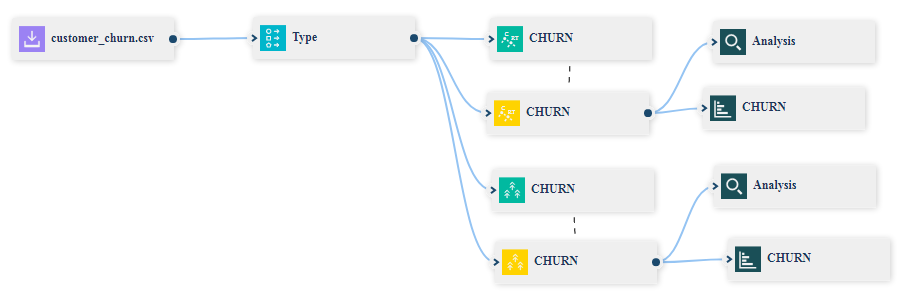
* Click on “Save” to return to the workspace.
* Run the flow again.
* On the right side of the workspace click on the “**Outputs and Versions**” icon to see the resulting analysis:



* Explore the results

**7. Add Second Modeling Technique to Flow**

* To the palette repeat the process for “**Random Trees**” that you did for “C&R Trees.” Your resulting workspace should look like the following:



* Explore the results.

**End of Lesson 3**

# Lesson 4: Watson Machine Learning

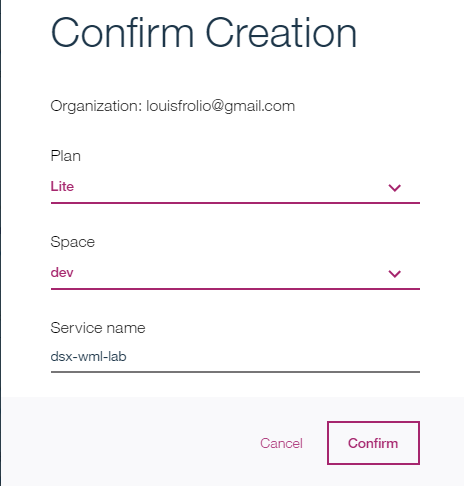
|  |  |
| --- | --- |
| Purpose: | This lab introduces Watson Machine Learning in DSX. Watson Machine Learning makes the task of machine learning easy with as little as a few clicks of the mouse. |
|  |  |
| Tasks: | Tasks you will complete in this lab exercise include:   * Creation of requisite services to support Watson Machine Learning * Creation of Watson Machine Learning Models * Model Performance Evaluation * Deployment and Prediction of Model |

## Lesson 4: Workflow Overview

## Lesson 4: Instructions

| Action |
| --- |
| **1. Create Machine Learning Service**   * Navigate to Customer Churn project page * At the top click on the “**Settings**” icon: |
| Scroll to the middle of the page and click on “Add service” then choose “Machine Learning”:     * On the Machine Learning page make sure that the tab is set to “New”, for the plan choose “Lite”: |

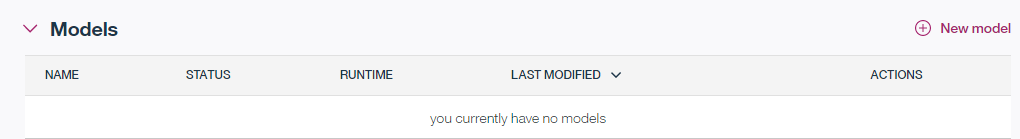
* Click on “**Create**”
* At the confirmation page you can give your service a meaningful name:



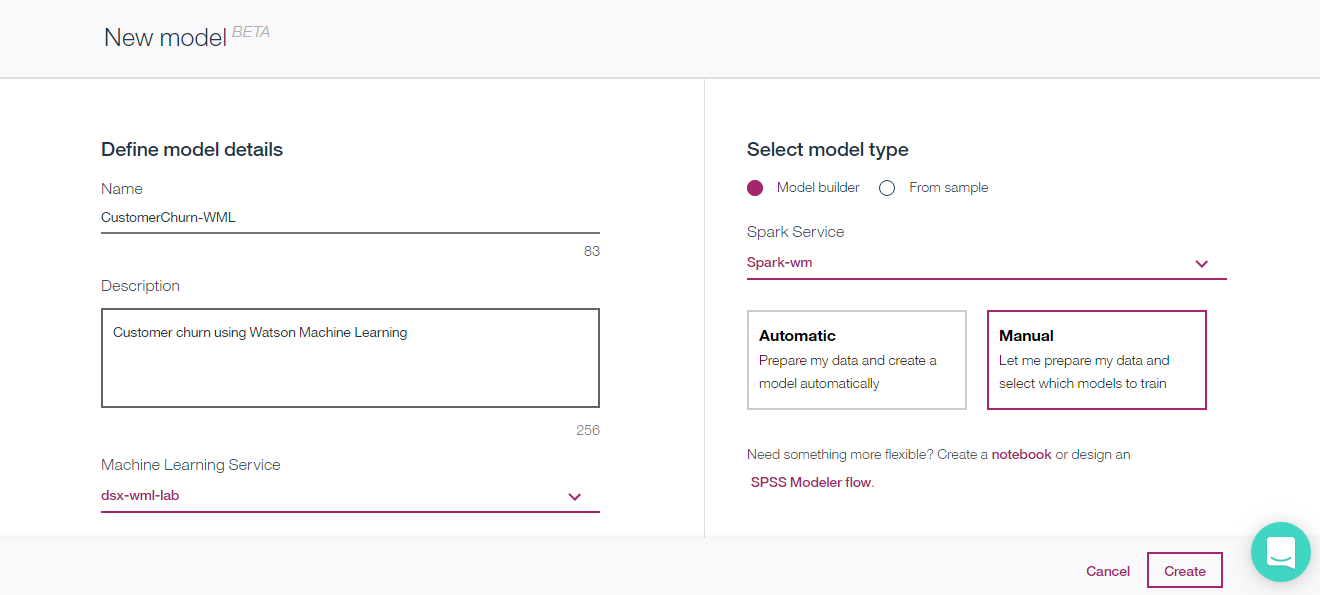
* Click “Confirm” to create Watson Machine Learning Service.

**2. Create Machine Learning Model**

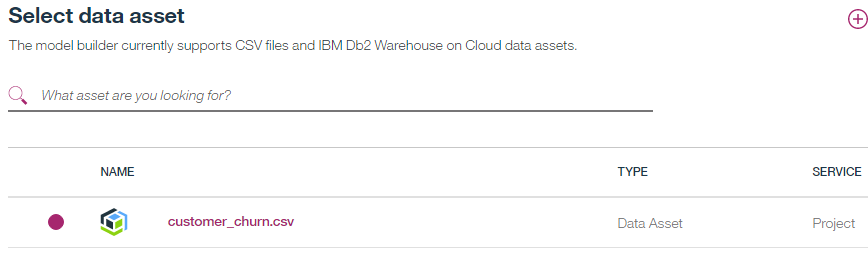
* In the Project click on “**Assets**” at the top of the window.
* In the middle of the page you will see “**Models**”, click on “New model”:



* In the “New model” window give your model a meaningful name and description, you should also see the machine learning service you just created. Click on “**Manual**” then “**Create**”:

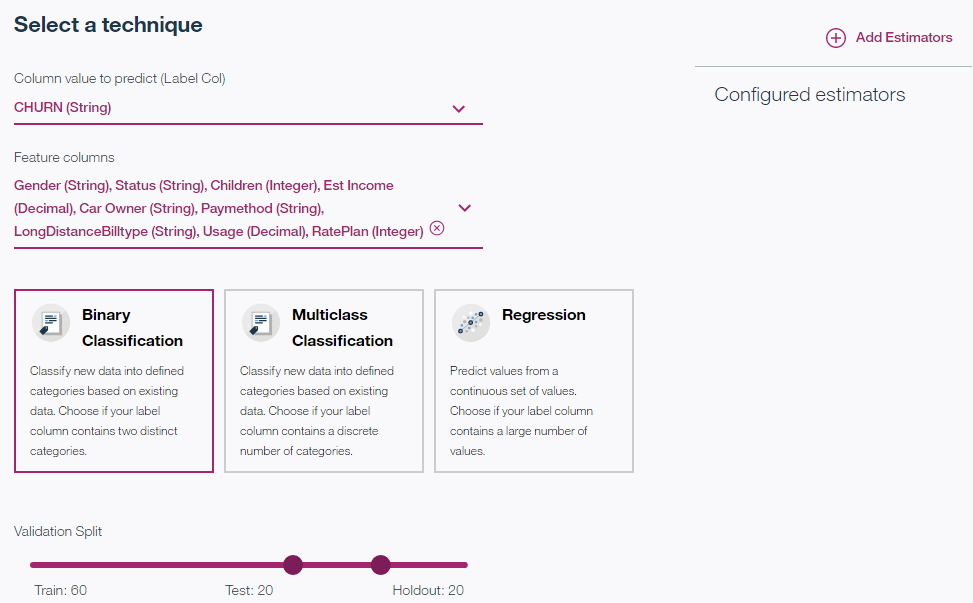


* When complete you will be prompted for a data asset, choose “customer\_churn.csv”, then click “Next.”



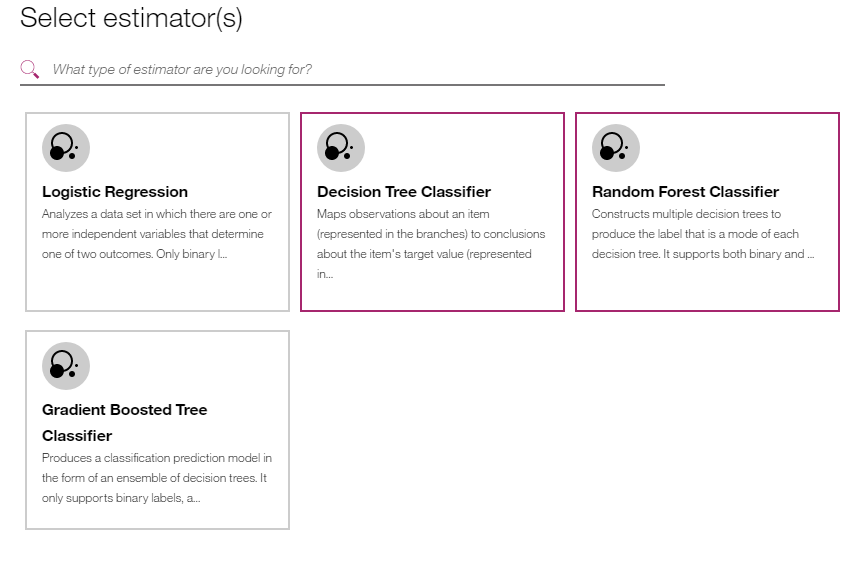
**3. Choose Modeling Technique**

* At the “**Select a Technique**” screen select “**CHURN**” as the “**Column value to predict**”, and for the feature columns choose 5 -9 identified in the Jupyter notebook lab. Also, make sure “**Binary Classification**” is highlighted:

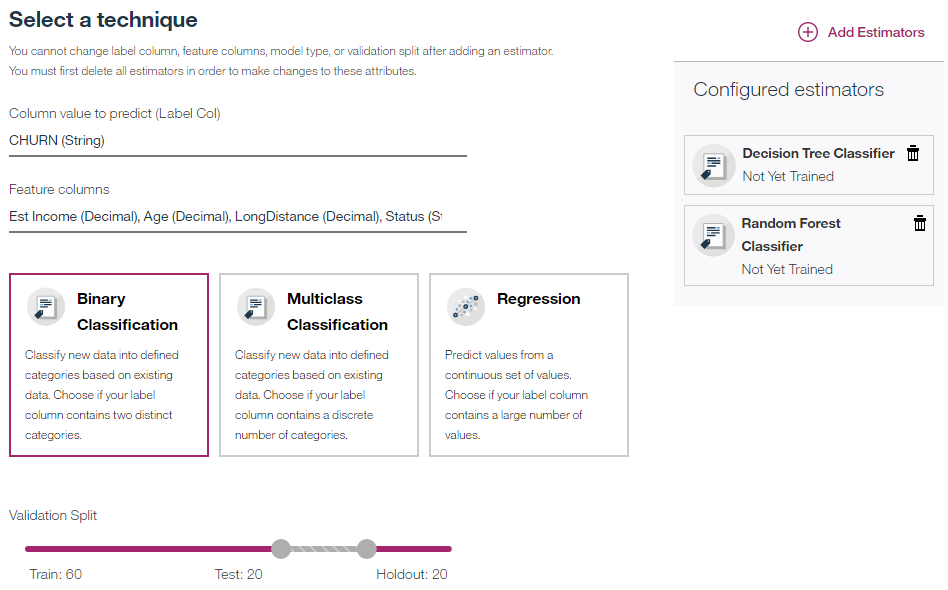


**4. Add Estimators**

* In the upper right-hand corner of the screen you will see “**Add Estimators**”, click on the icon. In the “Select estimator(s)” screen choose **Decision Tree Classifier**, and **Random Forest Classifier**:

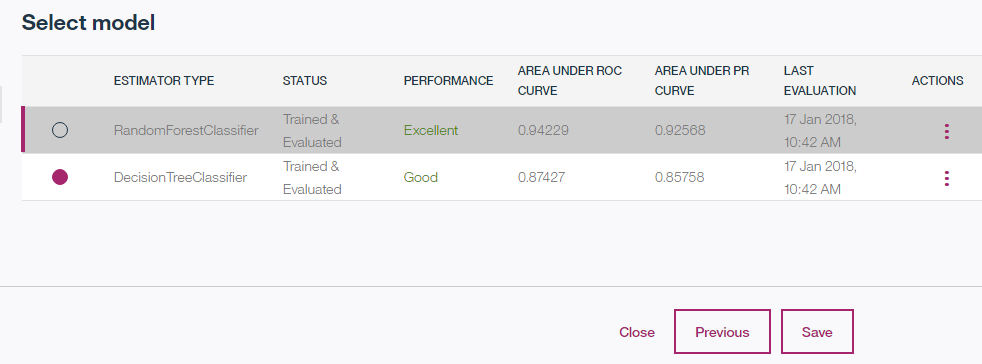


* Click “Add”:



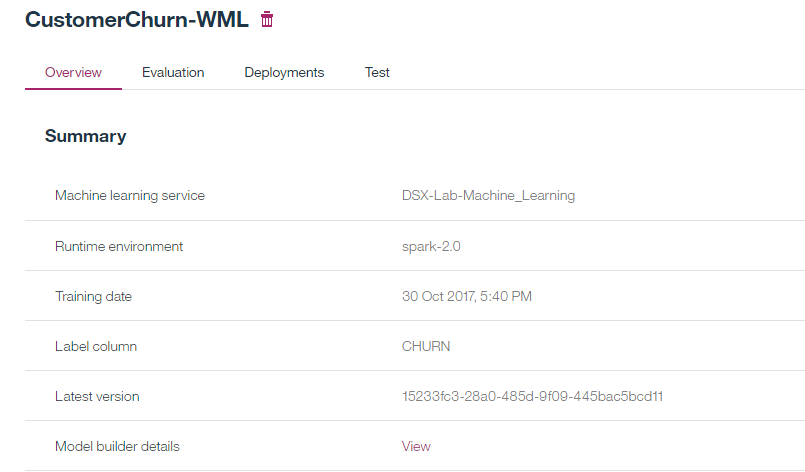
* Click “Next” to train models. This will take 1-2 minutes with the data set we are using:

**5. Evaluate Models**



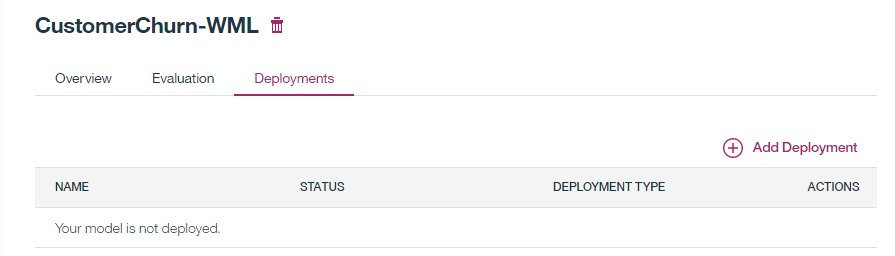
**6. Save & Deploy Model**

* Pick which model you want to keep then click “Save:”

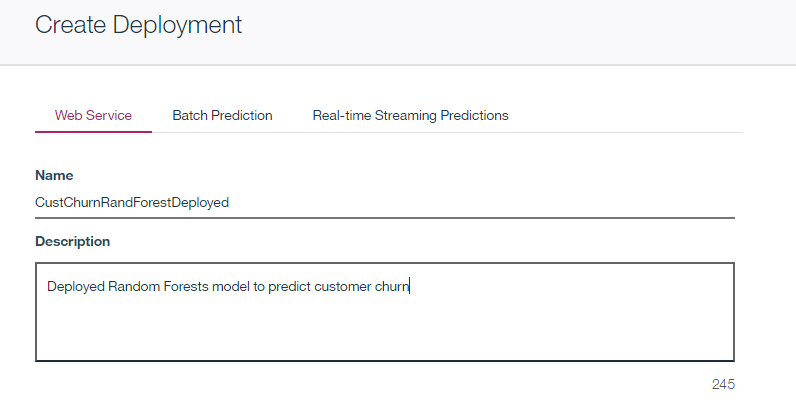


The overview page provides useful information about the model. This includes the ability to deploy and predict with the model.

* Click on “Deployments” then “**Add Deployment**”:



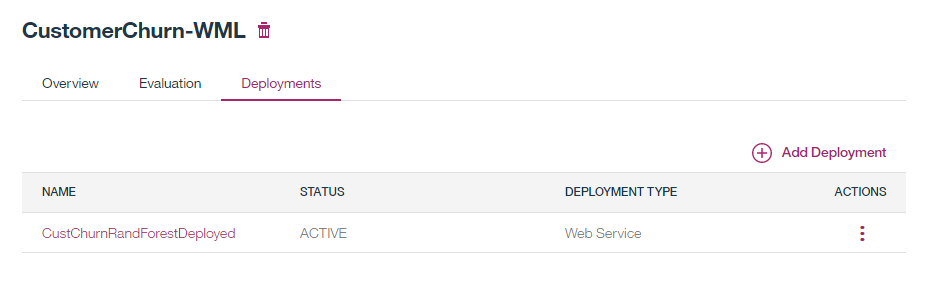
* For deployment type choose “**Batch Prediction**” then give the deployment a useful name:



* Click “Save”

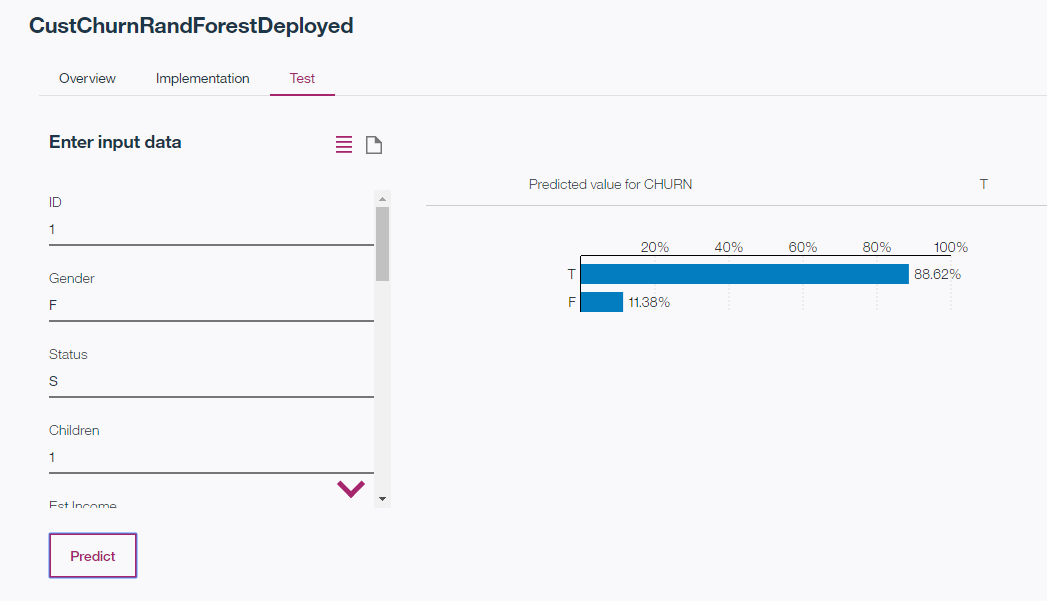
**7. Predict with Model**

* Choose newly created deployed model:



* Click on “**Test**” to test the model.

The input features will be pre-populated, but you can change them to see different outcomes. Just be sure that the values you add are valid as per the data set. **See “Summary Statistics**” from the Jupyter notebook exercise:



**End of Lesson 4**

**End of Hands-on Workshop**

**Thank You**