Build a logistic regression model with IBM Watson Machine Learning

Adapted from Tutorial: Build a logistic regression model with Watson Machine Learning

In this tutorial, you will build a logistic regression model that assesses the likelihood that a customer of an outdoor equipment company will buy a tent.

The input data used for training the model has a record of customer profile features together with their buying decision.

Preparation

Switch to the `DSX_Workshop` project, where you should have a Spark service instance available.
For more detailed information about setting up your machine learning environment, refer back to Lab 1.

Provide data to your project

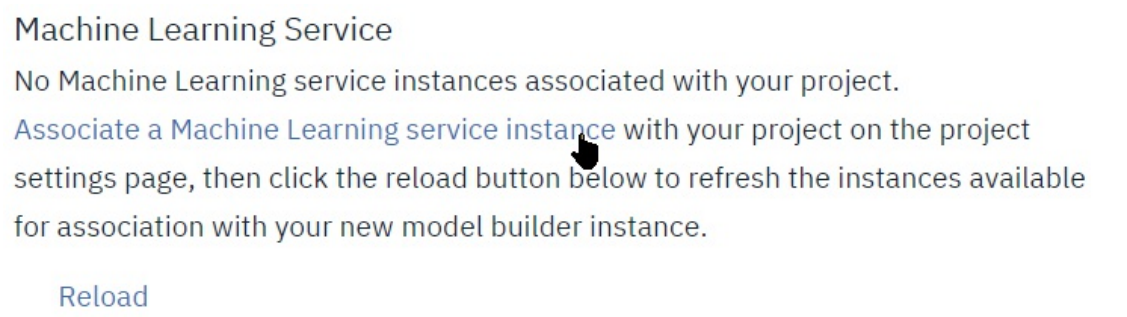
Ensure that the `GoSales_Tx.csv` file is part of the data assets for the project, oherwise ad it from the workshop's Box folder, referring to Lab 1 for instructions.

Also, refer to Lab 1 for insights on the Data Asset.

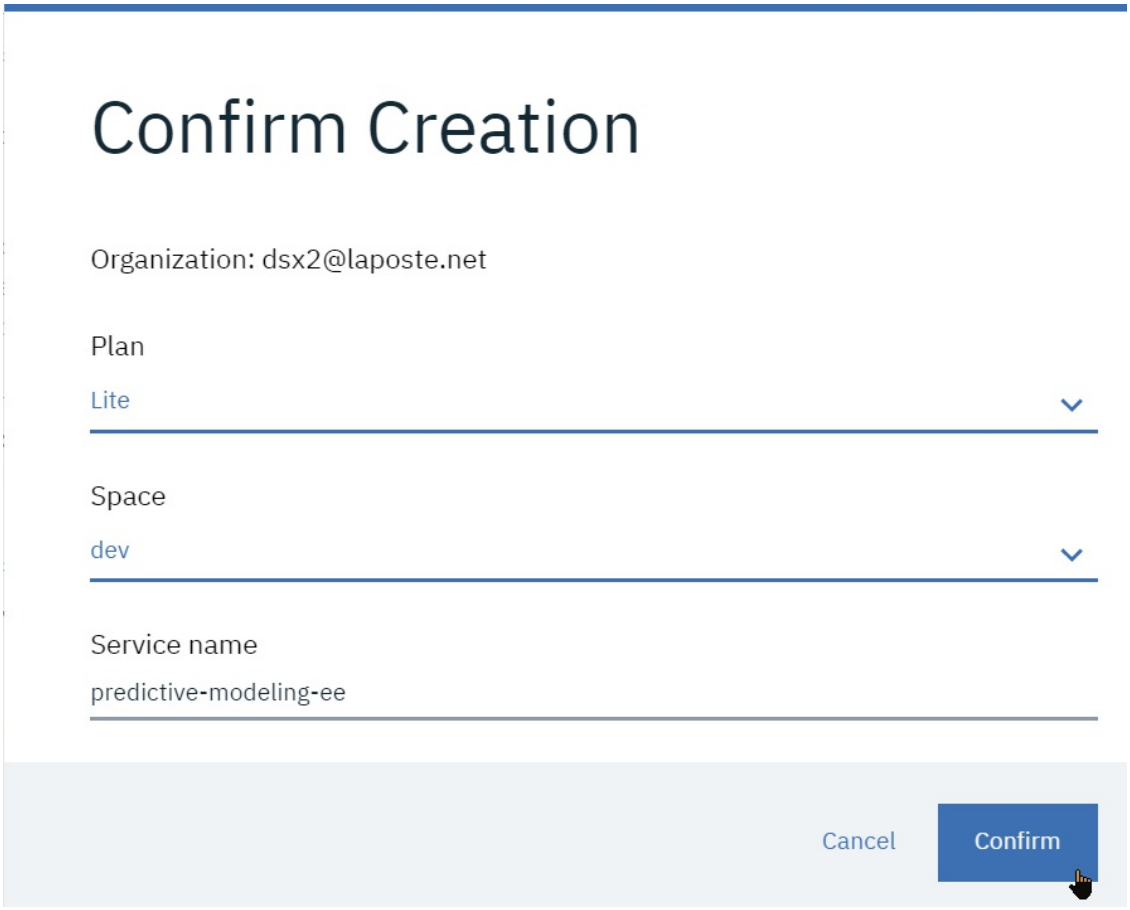
Model training

Create a model

1. From the project page click Add to project > Model.
2. Name the model e.g. `TentBuyingPredictor`.
3. Select the Machine Learning service.
    - If none exists, create one using the Lite plan defaults

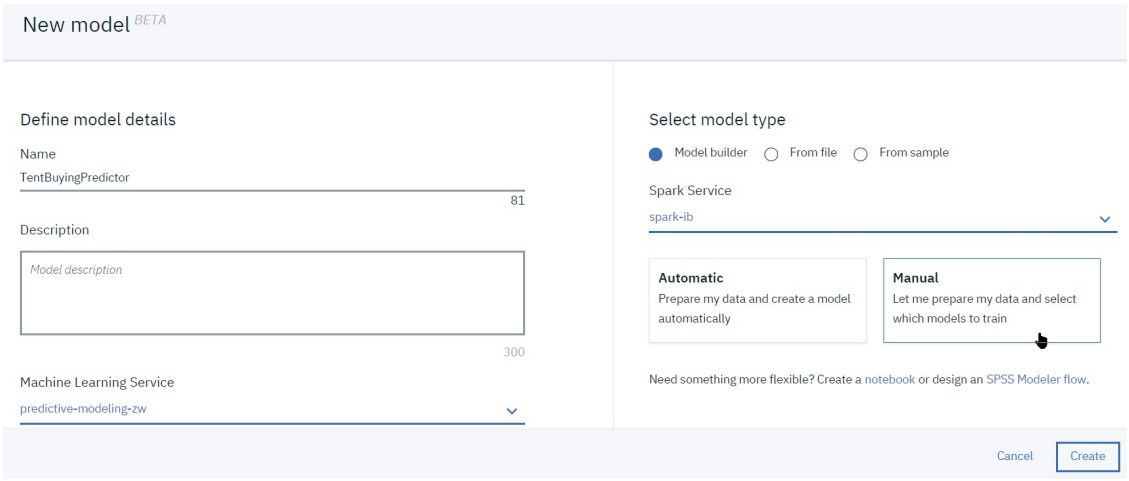


- Click `Associate a Machine Learning service instance`, this opens a new tab where you can create the ML Service instance.
- Select the Lite plan and accept de defaults

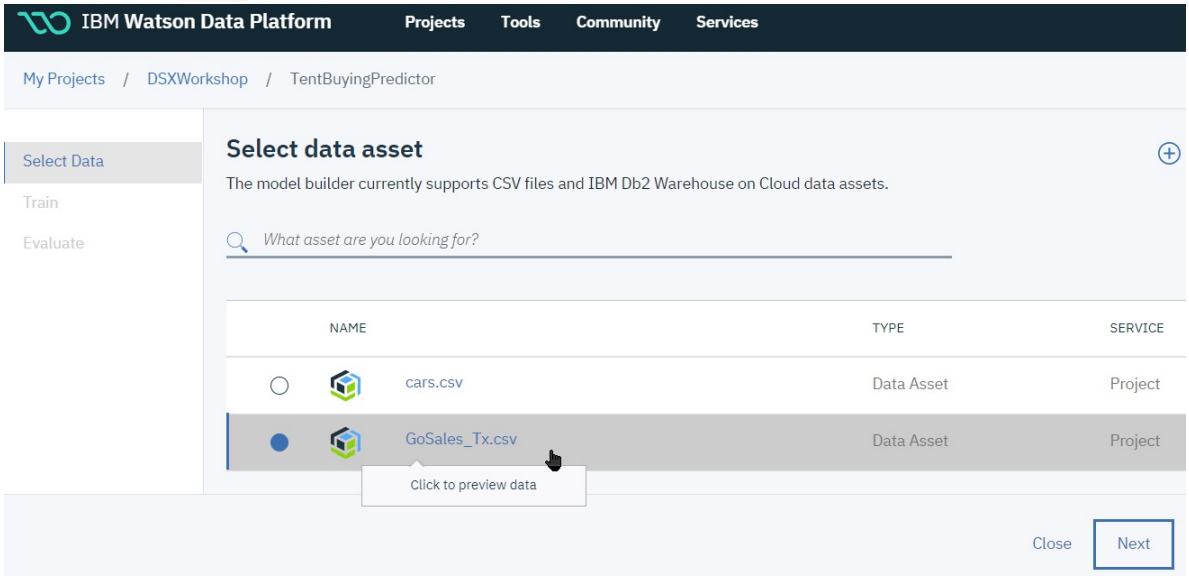


- Back to the Model definition page, click **Reload** and select the newly created Machine Learning Service.

4. Select the model type as `Model Builder`
5. Select the Spark service
   - Under Spark Service, select the Manual box on the right



6. Click **Create**
7. Once created, you are taken to the 'Select data asset' page, select the `GoSales_Tx.csv` file and click `Next`.



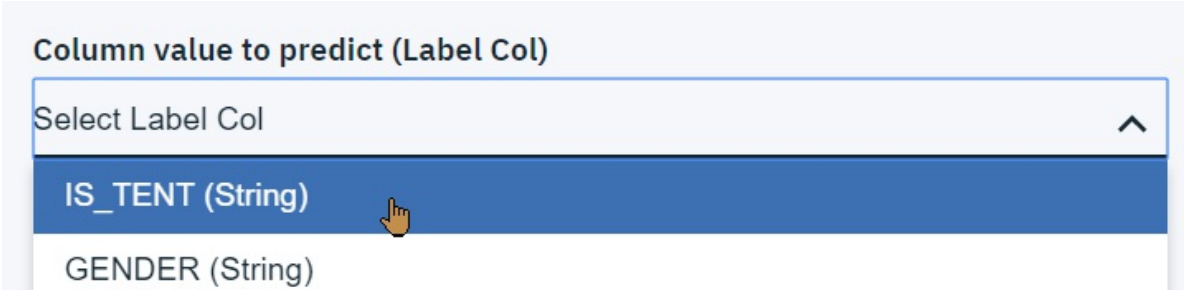
Train the model

After you load the data, you must **train** the model.
This consists of choosing an appropriate technique and estimator to apply to the raw data.
For this data set, we will predict the buying behavior, represented in the `IS_TENT` column.
We will use Logistic Regression estimator for the following reasons:

1. A logistic regression enables you to use multiple explanatory variables that can be ordinal, continuous, or dichotomous.
2. A logistic regression gives a quantified value for the strength of the prediction, controlling for other factors.
3. For this particular analysis the receiver operator characteristic (ROC) produces an excellent performance result.

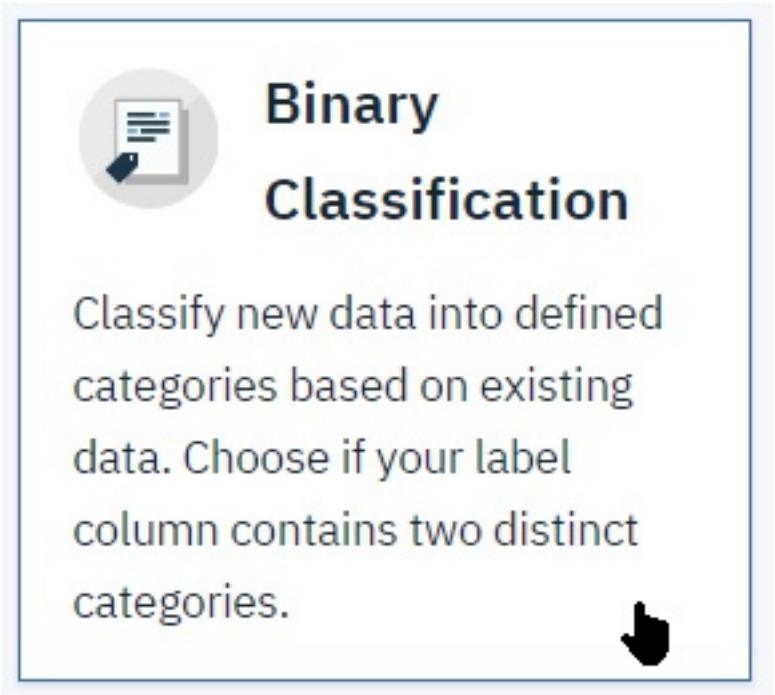
Steps

1. On the 'Select a technique' page, for the 'Column value to predict', select `IS_TENT`:

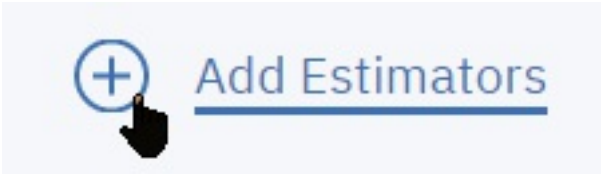


2. Keep `All (default)` for the feature columns. If the dataset had included for example an Customer_ID column, we would have removed it from the features as being a unique identifier it should have no impact on the buying behavior.

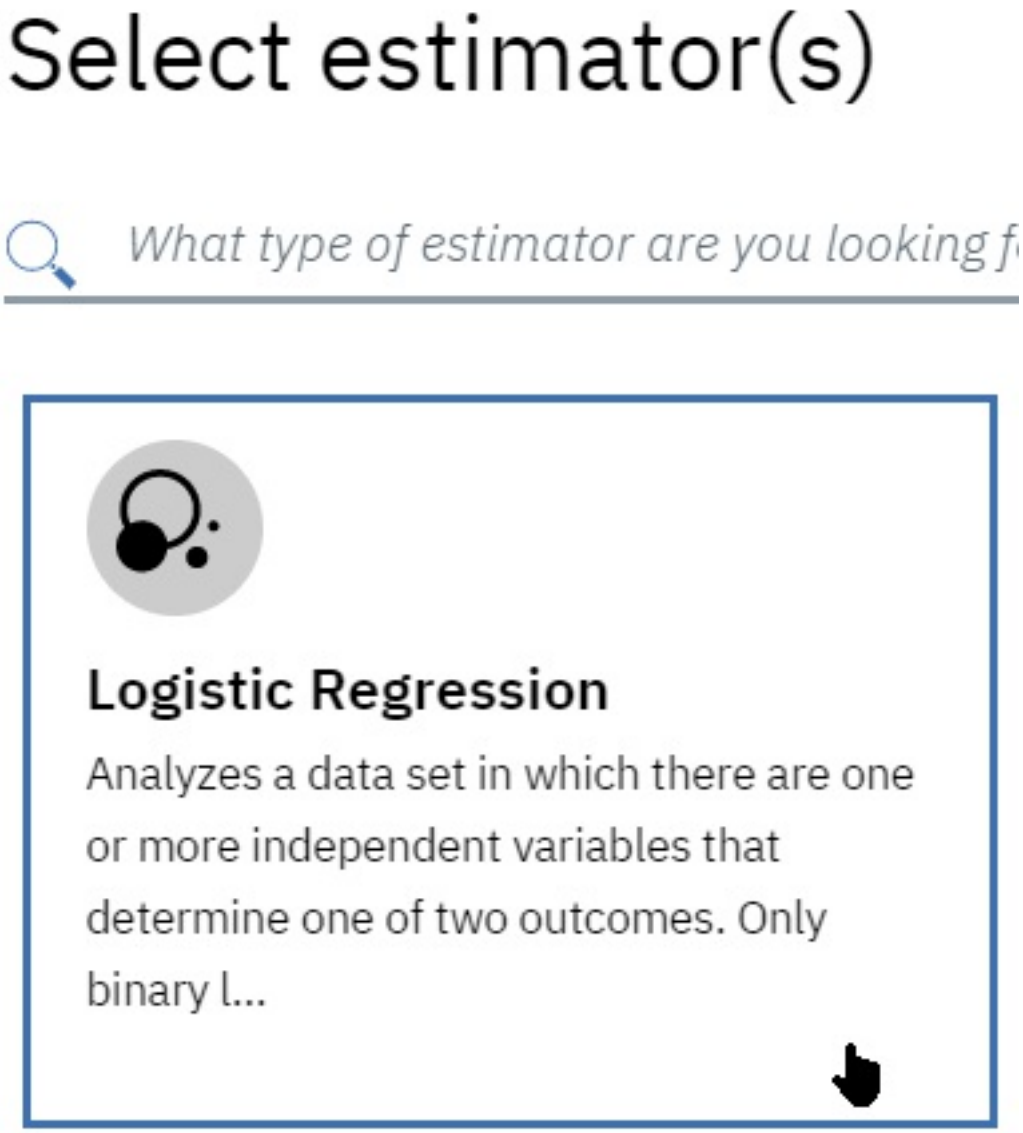
3. For the technique, select Binary Classification:



4. To add and configure an estimator

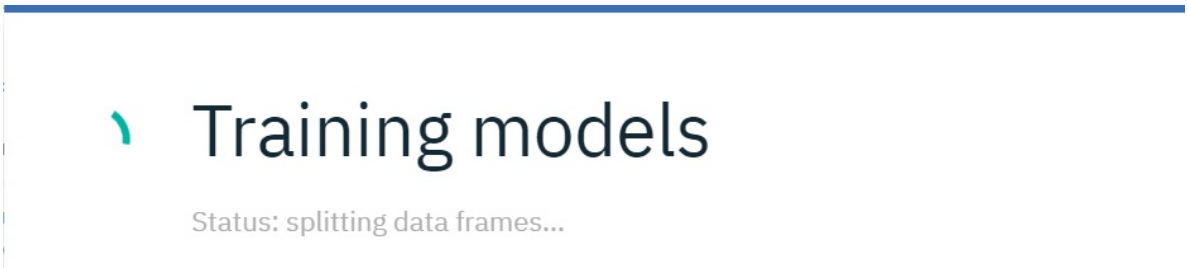


   - click `Add Estimators`
   - select `Logistic Regression`



- click **Add**.

5. Click **Next**. This will start training the model



After the training completes, on the `Select model` page, **click** the model you just created, and then, click **Save**, and confirm **Save** again.

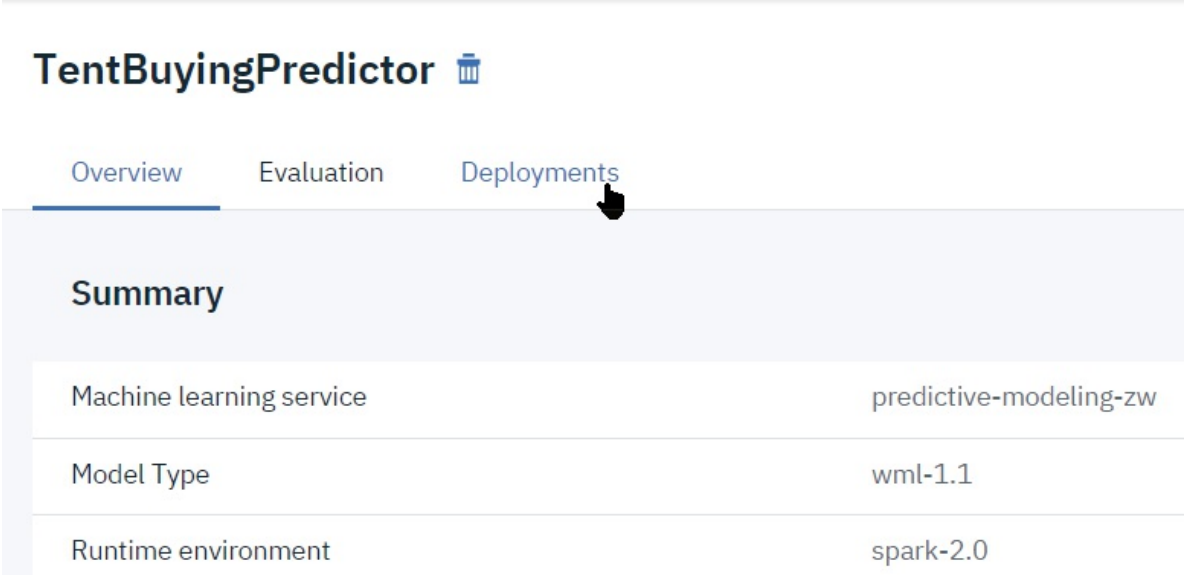
The model is now trained and ready for execution.

Deploy and test

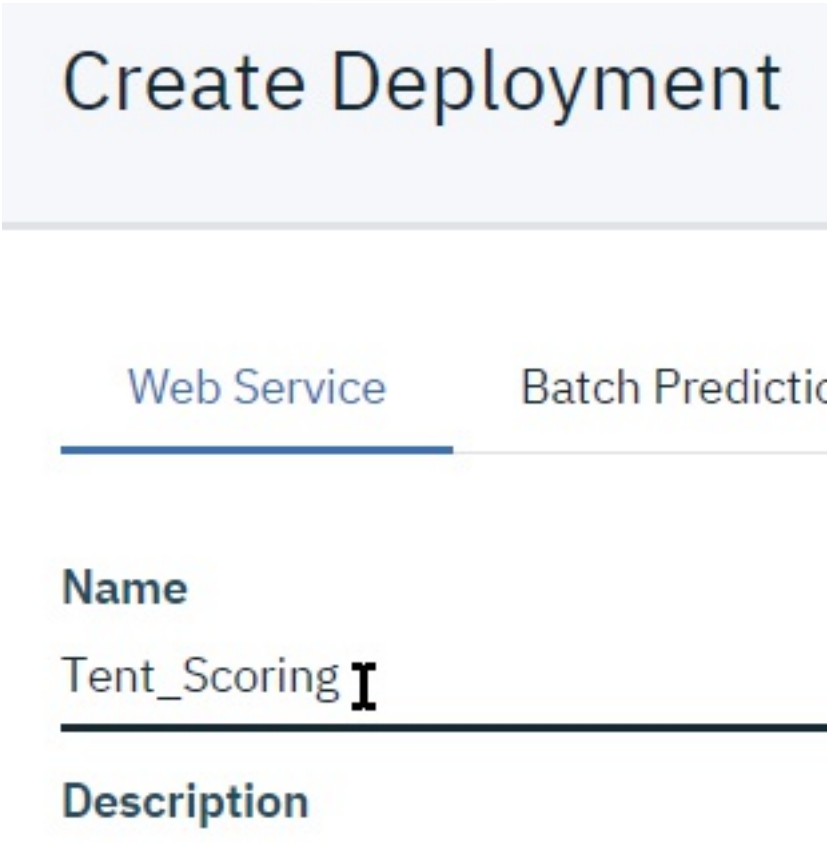
After you train and save the model, you must deploy it. This is also a good time to do a check on the data and the results.

Steps

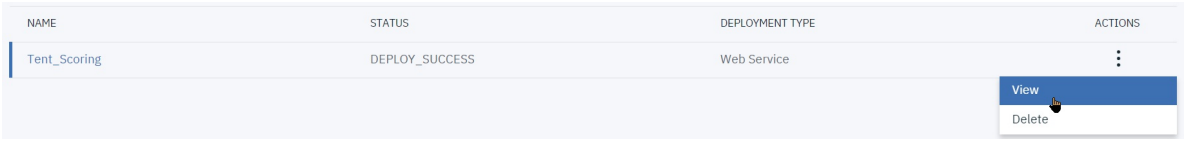
1. On the model page, switch to the `Deployment` tab and click `Add Deployment`.



2. On the `Create Deployment` page, select the `Web Service` deployment type, and enter a deployment name, e.g. `Tent_Scoring`, then **Save**



3. When model deployment is complete, you can View the details clicking on `Actions` and `View`



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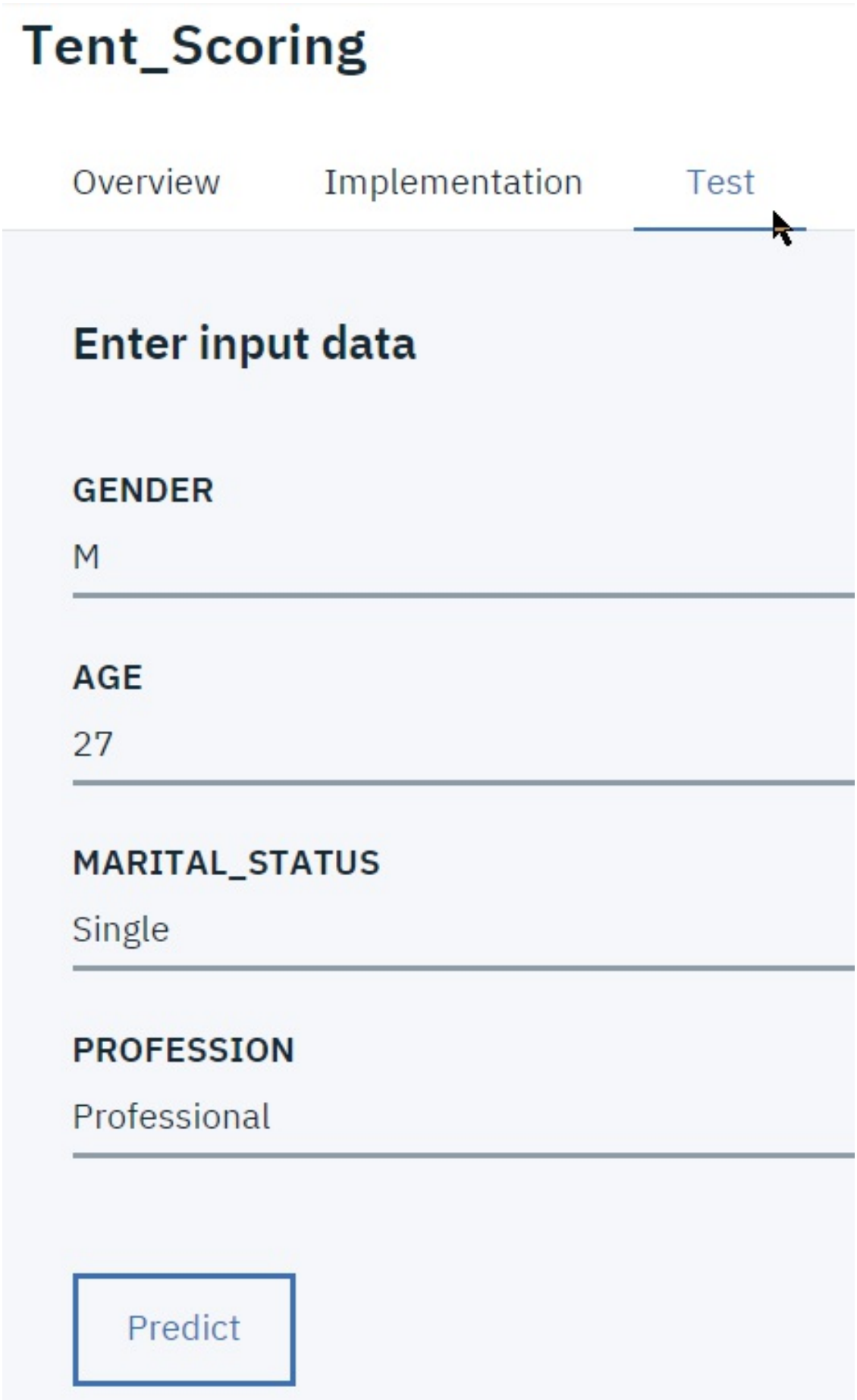
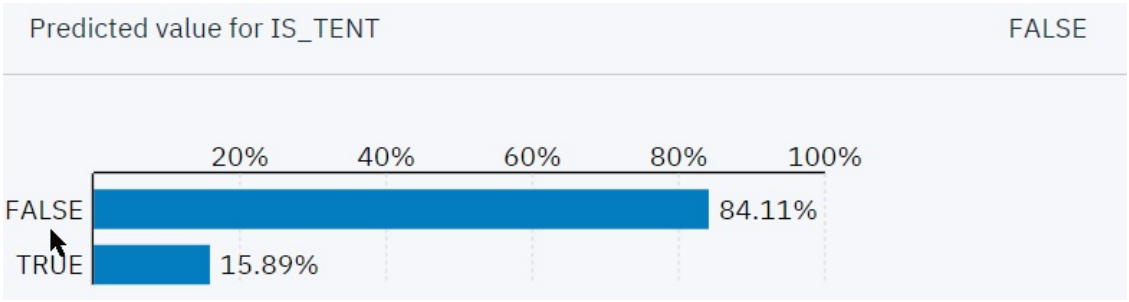
4. The `Implementation` tab gives information on endpoint URL, as well as a few invocation examples in cURL, Python, … The credentials would need to be obtained from the **IBM Watson Machine Learning** service definition in IBM Cloud.
5. Test the model prediction:
    i. From the details view, switch to the `Test` tab:



ii. A sample input data record is populated with a sample record from the data set.

iii. To test the model, change the values and click **Predict**. The scoring result is displayed:



Summary

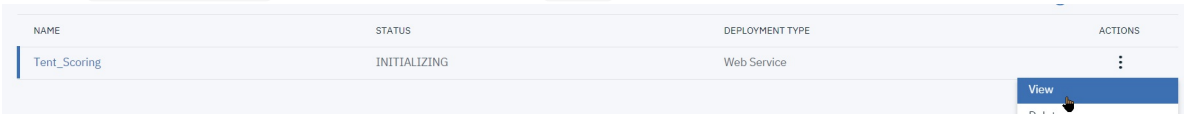
You successfully completed this machine learning tutorial!
You learned how to use the model builder to predict the likelihood that someone will buy a tent.

Stretch Lab Part 2: run the model from a python notebooks

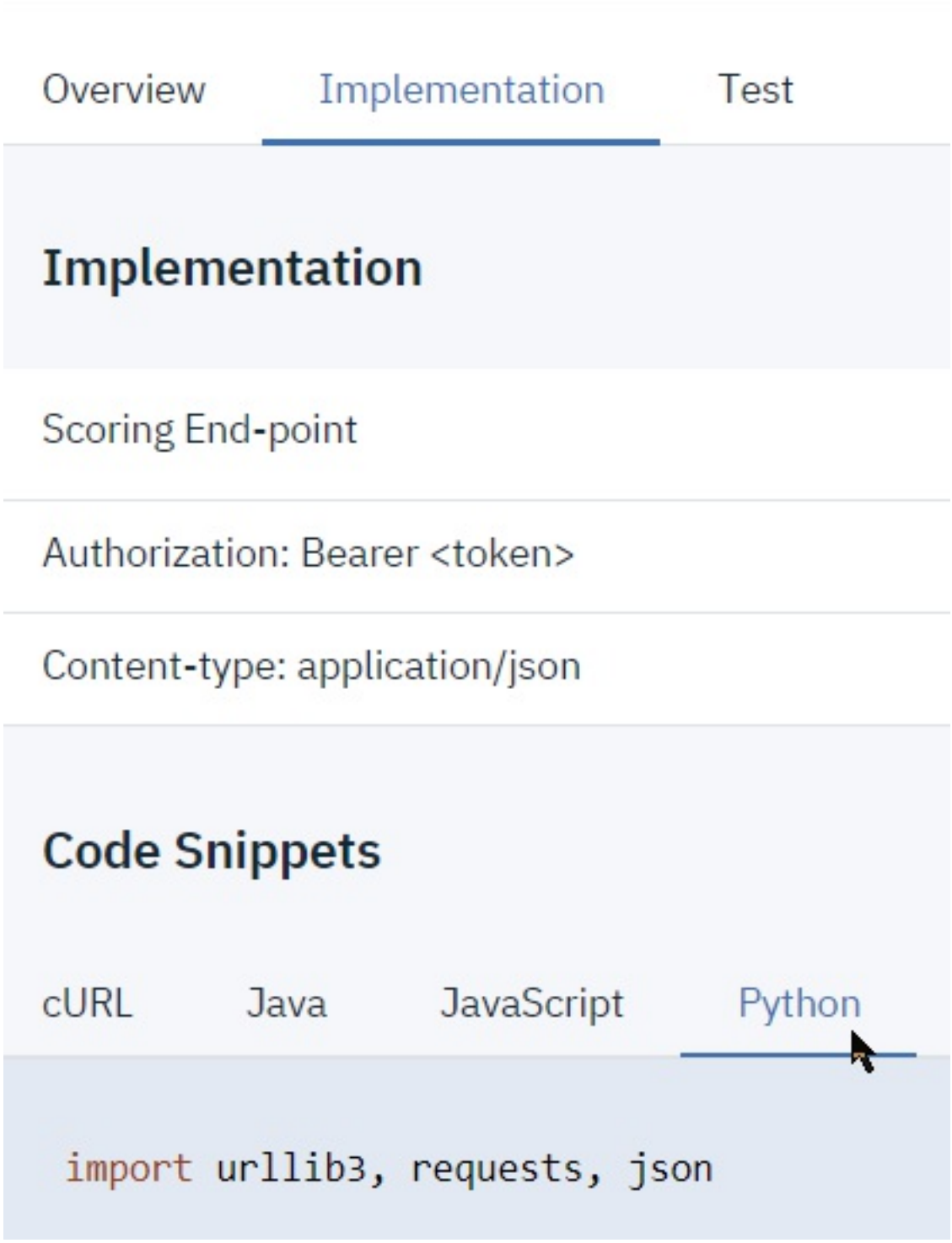
The model just deployed can be invoked from a notebook, you may want to run through the `Lab4-Part2-RunModelFromNotebook_cleared.ipynb` notebook.

Before creating the notebook, you may want to record your **IBM Watson Machine Learning Service** credentials, and `Tent_Scoring` endpoint code:

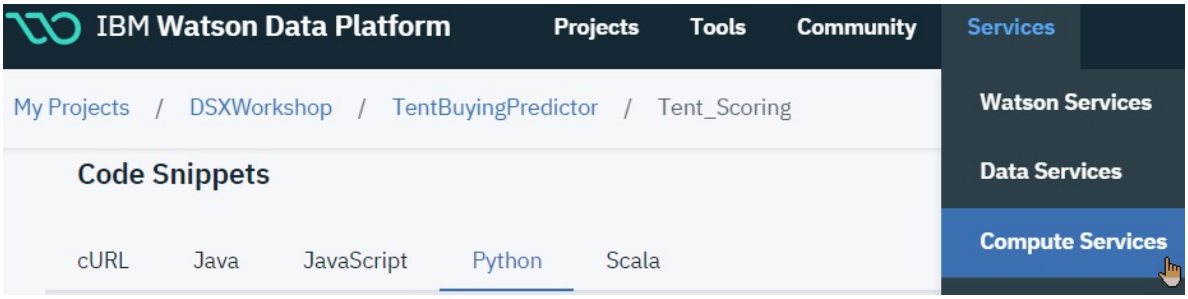
- In the `Tent_Scoring` deployment, select `View` from the menu



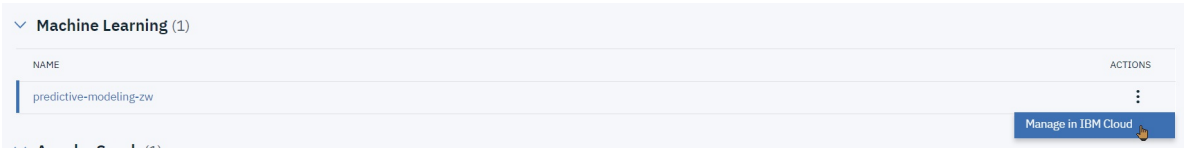
- Select the `Implementation` tab, and then under `Code Snippets`, the `Python` tab



- **Copy** the code in the light blue box to a notepad document for later reference
- From the main menu bar, select the `Services` menu and then the `Compute Services`



- In the `Machine Learning` section, locate your service, and select `Manage in IBM Cloud` from its menu



- Select the `Service Credentials` tab

- Expand `View Credential`, and copy&paste the contents of the blue box (between curly braces { } to a notepad document

Now you can switch back to **IBM Watson Studio** and add a notebook from the `Lab4-Part2-RunModelFromNotebook_cleared.ipynb` file and follow the instructions from the Notebook.