Tutorial: Build predictive analytics applications with Watson Machine Learning

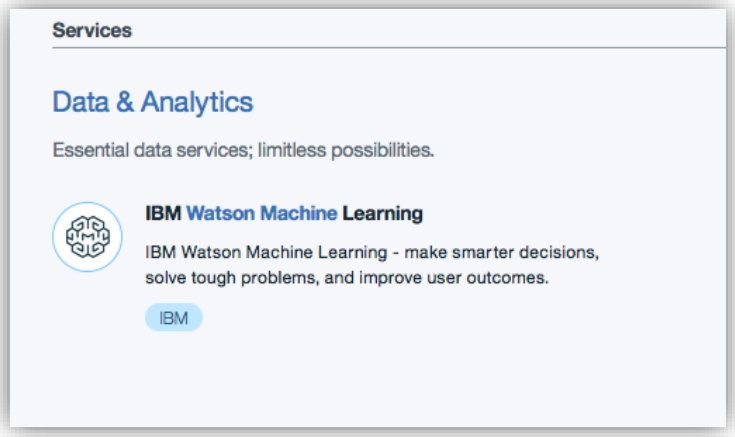
You can add your own Data Science Experience projects to Watson Machine Learning, or use provided samples. This document shows you how to deploy and use sample models or models created in Data Science Experience projects through the REST API.

Note: You can have only one online deployment per service instance.

Example: Product line prediction

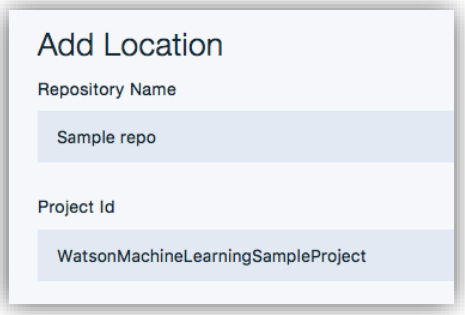
Our client is running one of the most famous chain stores in Europe. They would like us to figure out their clients' interests regarding their product line, which includes items such as Personal Accessories, Camping Equipment, and Outdoor Protection. A Data Scientist develops a predictive model and shares it with you (the developer). Your task is to deploy the model and generate predictive analytics by making score requests against the deployed model.

1. Log on to Bluemix and create an instance of Watson Machine Learning.



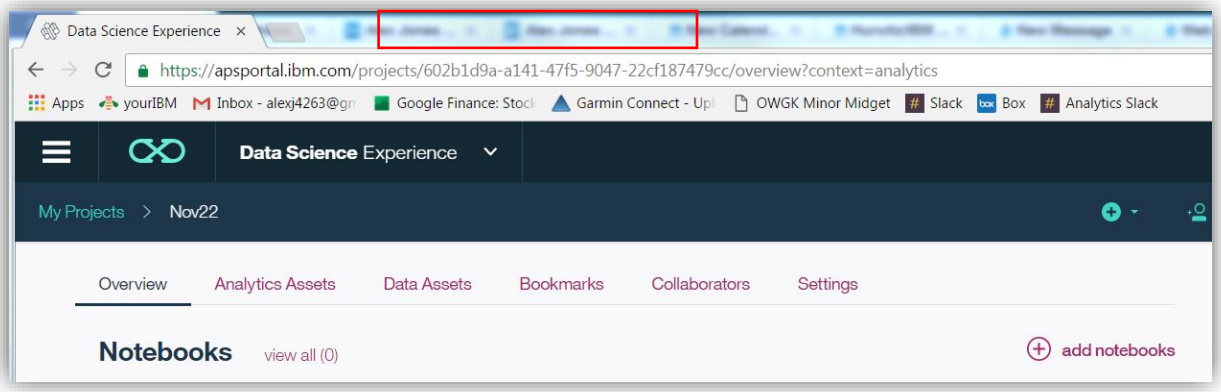
2. Launch the Watson Machine Learning Dashboard.
3. Click **Add Location** to connect to a Data Science Experience project, or to add a sample models location. If you connect to a Data Science Experience project, you can use models and deployments created in Data Science Experience within Watson Machine Learning on Bluemix.

4. Specify the Repository Name, and type *WatsonMachineLearningSampleProject* for the Project ID.



You should now see three sample models available for deployment.

Note: If you want to use your own Data Science Experience project and models instead of the samples, you must include your own project identifier. Temporarily, during the Watson Machine Learning beta period, you must obtain this identifier from the URL you see within Data Science Experience when your project isopen. For example, in the following Data Science Experience project, the example identifier 602b1d9a-a141-47f5-9047-22cf187479cc is highlighted in red:

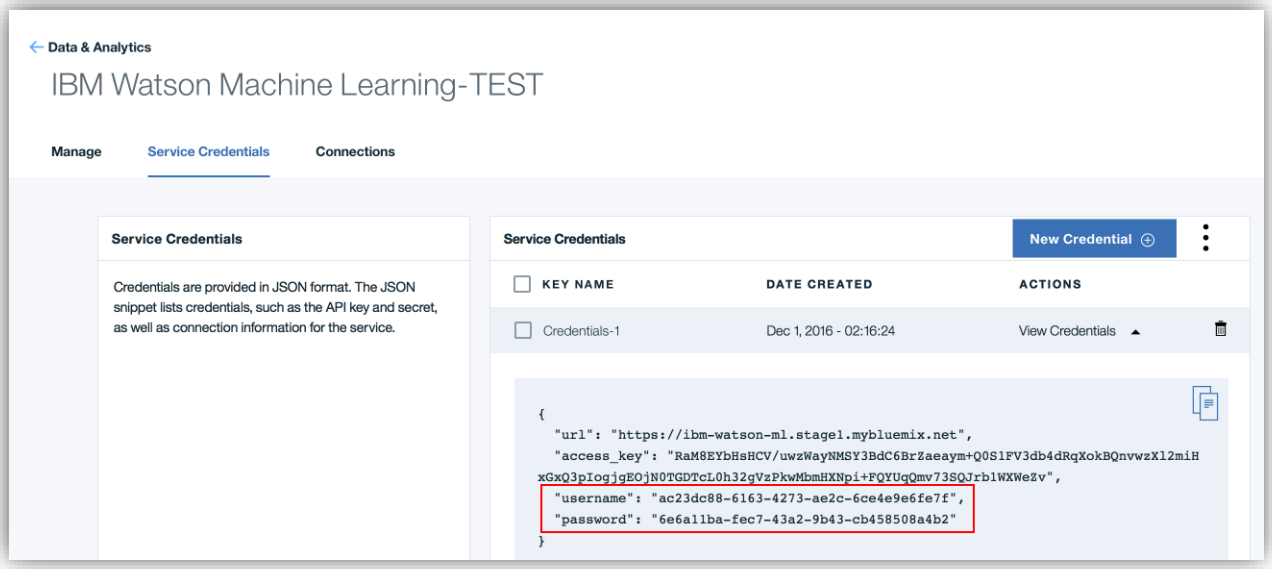


Note that you can add more than one project identifier, if desired.

5. From the **Action** menu, select **Create Deployment** to deploy the *GoodsCategoryPrediction* model as an online deployment.
6. Specify the deployment name (for example, *Product line prediction*) and click **Save**.
   You should now see the *Product line prediction* deployment in the Deployments list.
7. From the **Action** menu, select **View Details** for your deployment. The **Scoring Endpoint** presented in the details pane will be used to run scoring requests.

8. To run scoring requests through the REST API, a scoring endpoint and an authorization token are required. To obtain an authorization token, you can use the sample curl shown below that requires a username / password to be present under **Service Credentials** (on the service welcome page).

```
curl --basic --user username:password
https://ibm-watson-ml.mybluemix.net/v2/identity/token
```



Now you can run scoring requests by providing the **Authorization_Token** and **Scoring_Endpoint** generated in the previous step.

```
curl -XPUT \
-H "Content-Type:application/json" \
-H "Authorization:Bearer Authorization_Token" \
-d '{"record":["F",56,"Unspecified","Hospitality"]}' \
Scoring_Endpoint
```

Note: On **Windows**, the curl command requires escaped inner quotes and wrapping double quotes for the data record:

```
curl -XPUT -H "Content-Type: application/json" -H "Authorization: Bearer Authorization_Token" -d "{\"record\":[\"F\",56,\"Unspecified\",\"Hospitality\"]}" Scoring_Endpoint
```

Sample output:


```
{"result":{"MARITAL_CODE":2.0,"GENDER":"F","prediction":1.0,"AGE":56,"MARITAL_STATUS":"Un
specified","PROFESSION_CODE":5.0,"FEATURES":{"values":[56.0,5.0,2.0,1.0]},"GENDER_CODE":1
.0,"rawPrediction":{"values":[-33.3036135382579,-33.059013422448075,-33.59486208926039,
-36.330601384016816,-35.44435422904002]},"PROFESSION":"Hospitality",
"probability":{"values":[0.31343348904525364,0.400289204543129,0.2342382196969746,0.01518
9423080212922,0.03684966363442985]}}}
```


The **prediction** field contains the predicted product line for a 56-year-old female who works in the hospitality profession and has an unknown marital status. Her predicted product line is Personal Accessories based on mapping table 2.

The mapping table and other sample records are shown in the following table.

Table 1: Sample data records

"GENDER"	"AGE"	"MARITAL_STATUS"	"PROFESSION"
"M"	27	"Single"	"Professional"
"F"	61	"Married"	"Other"
"F"	56	"Unspecified"	"Hospitality"
"F"	43	"Unspecified"	"Hospitality"
"M"	29	"Single"	"Other"
"F"	25	"Single"	"Professional"
"M"	47	"Married"	"Other"
"F"	18	"Single"	"Student"
"F"	31	"Married"	"Executive"
"M"	28	"Single"	"Trades"

Table 2: Index to product line mapping

index	Product line
0	Camping Equipment
1	Personal Accessories
2	Mountaineering Equipment
3	Golf Equipment
4	Outdoor Protection

You can now test your deployment using a tool such as curl to obtain a single result via a command line.

You can also experiment with the **sample node.js application** available at https://github.com/pmservice/product-line-prediction.

To deploy the sample application, see the README.md file at https://github.com/pmservice/product-line-prediction/blob/master/README.md.

The Watson Machine Learning REST API swagger documentation is available at http://watson-ml-api.mybluemix.net/.