

Machine Learning

## Model Metrics

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# CLOUDERA

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## Enabling model metrics

Metrics are used to track the performance of the models. When you enable model metrics while creating a workspace, the metrics are stored in a scalable metrics store. You can track individual model predictions and analyze metrics using custom code.

### About this task

#### Procedure

1. Go to Cloudera Machine Learning and click Provision Workspace on the top-right corner.
2. Enter the workspace name and other details.
3. Click Advanced Options.
4. Select Enable Model Metrics.

If you want to connect to an external (custom) Postgres database, then specify the details in the additional optional arguments that are displayed. If you do not specify these details, a managed Postgres database will be used to store the metrics.

## Tracking model metrics without deploying a model

Cloudera recommends that you develop and test model metrics in a workbench session before actually deploying the model. This workflow avoids the need to rebuild and redeploy a model to test every change.

Metrics tracked in this way are stored in a local, in-memory datastore instead of the metrics database, and are forgotten when the session exits. You can access these metrics in the same session using the regular metrics API in the `cdsw.py` file.

The following example demonstrates how to track metrics locally within a session, and use the `read_metrics` function to read the metrics in the same session by querying by the time window.

To try this feature in the local development mode, use the following files from the Python template project:

- `use_model_metrics.py`
- `predict_with_metrics.py`

The `predict` function from the `predict_with_metrics.py` file shown in the following example is similar to the function with the same name in the `predict.py` file. It takes input and returns output, and can be deployed as a model. But unlike the function in the `predict.py` file, the `predict` function from the `predict_with_metrics.py` file tracks mathematical metrics. These metrics can include information such as input, output, feature values, convergence metrics, and error estimates. In this simple example, only input and output are tracked. The function is equipped to track metrics by applying the decorator `cdsw.model_metrics`.

```
@cdsw.model_metrics
def predict(args):
    # Track the input.
    cdsw.track_metric("input", args)

    # If this model involved features, ie transformations of the
    # raw input, they could be tracked as well.
    # cdsw.track_metric("feature_vars", {"a":1,"b":23})

    petal_length = float(args.get('petal_length'))
    result = model.predict([[petal_length]])
    # Track the output.
    cdsw.track_metric("predict_result", result[0][0])
```

```
return result[0][0]
```

You can directly call this function in a workbench session, as shown in the following example:

```
predict(  
  {"petal_length": 3}  
)
```

You can fetch the metrics from the local, in-memory datastore by using the regular metrics API. To fetch the metrics, set the `dev` keyword argument to `True` in the `use_model_metrics.py` file. You can query the metrics by model, model build, or model deployment using the variables `cdsw.dev_model_crn` and `cdsw.dev_model_build_crn` or `cdsw.dev_model_deploy_crn` respectively.

For example:

```
end_timestamp_ms=int(round(time.time() * 1000))  
cdsw.read_metrics(model_deployment_crn=cdsw.dev_model_deployment_crn,  
  start_timestamp_ms=0,  
  end_timestamp_ms=end_timestamp_ms,  
  dev=True)
```

where CRN denotes Cloudera Resource Name, which is a unique identifier from CDP, analogous to Amazon's ARN.

## Tracking metrics for deployed models

When you have finished developing your metrics tracking code and the code that consumes the metrics, simply deploy the `predict` function from `predict_with_metrics.py` as a model. No code changes are necessary.

Calls to `read_metrics`, `track_delayed_metrics`, and `track_aggregate_metrics` need to be changed to take the CRN of the deployed model, build or deployment. These CRNs can be found in the model's **Overview** page.

Calls to the `call_model` function also requires the model's access key (`model_access_key` in `use_model_metrics.py`) from the model's **Settings** page. If authentication has been enabled for the model (the default), a model API key for the user (`model_api_token` in `use_model_metrics.py`) is also required. This can be obtained from the user's **Settings** page.