



Multi Objective Optimization Streamlit Application Guide




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DataRobot



DR Notebook Upload

run_multi_objective_optimization_app


Created by Jin Zhan

 **Started**  [DataRobot] Python 3.9 Notebook Drop-In S · 2CPU · 8GB 


ENVIRONMENT

 **Started** 


Resource type ⓘ

S · 2 CPU · 8 GB 



Environment ⓘ


[DataRobot] Python 3.9 Notebook Drop-In 

Version ⓘ

v11 

RUNTIME

CPU	RAM
0.1%	0.19GB
	2.4% 



Multi-objective Optimization Streamlit Application

- Author: senkin.zhan@datarobot.com

Summary


This accelerator introduces an approach to build a streamlit application using DataRobot deploymets for multi-objective optimization.

This notebook outlines how to:

1. Create multiple projects
2. Build deployment with best model
3. Build Streamlit application connecting to DataRobot

Bind variables then run DR notebook

Bind variables

```
Cell heading 

# DataRobot Input Path
input_path = './multi-objective-optimization/'

# credentials
API_URL = '<INSERT Deployment API URL>'
DATAROBOT_API_TOKEN = '<INSERT YOUR DataRobot API Token>'
DATAROBOT_KEY = '<INSERT DataRobot Key>'

credentials = [API_URL, DATAROBOT_API_TOKEN, DATAROBOT_KEY]
with open(input_path+'credentials.pickle', mode='wb') as fo:
    pickle.dump(credentials, fo)

# If use groupkfold input group column ["Group_ID"], if use randomkfold input False
group_col = False

# File name, default is japanese version, if use english input steel_strength_en
file_name = 'steel_strength_jp.csv'

# Targets(multiple objective), default is japanese version, if use english input ['Yield Strength', 'Elongation', 'Average Yield Strength']
targets = ['降伏強度', '引張強度', '平均強度']

# Optimization Directions, choose minimize or maximize, max 30 targets
directions = ['maximize', 'maximize', 'maximize']

# Streamlit App name
app_name = "multi-objective-optimization-demo"
```

- Setup Bind variables
- Run notebook

Streamlit - Simulation



Simulation Visualization

Select features to be simulated

炭素 × マンガン × ケイ素 × クロム × ニッケル × モリブデン ×
バナジウム × 窒素 ×

Simulated Features

炭素	min 0.00 - +	max 0.43 - +
マンガン	min 0.01 - +	max 3.00 - +
ケイ素	min 0.01 - +	max 4.75 - +
クロム	min 0.01 - +	max 17.50 - +
ニッケル	min 0.01 - +	max 21.00 - +

- Select the features need to be simulated
- Input each features' values range(default:min to max)

Streamlit - Simulation



Dropped Features

ニオブ

mean

0.04

- +

コバルト

mean

7.01

- +

タンゲステン

mean

0.16

- +

アルミニウム

mean

0.24

- +

チタン

mean

0.31

- +

- Input dropped features' constant values(default:mean)

Streamlit - Simulation



Run Simulation

Trials Number

100

- +

Simulation Start!

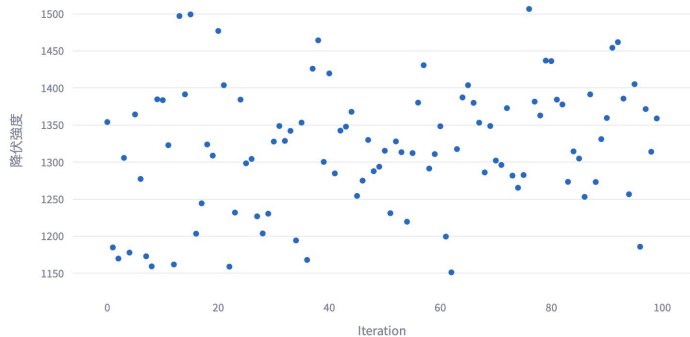
- Input trials number(default:100)
- Click [Simulation Start!]

Streamlit - Visualization

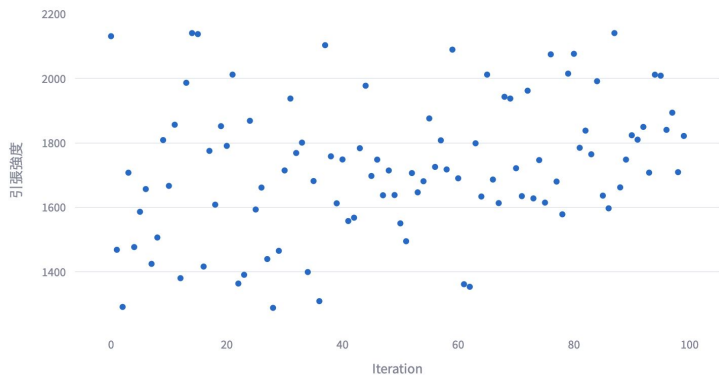


Simulation Visualization

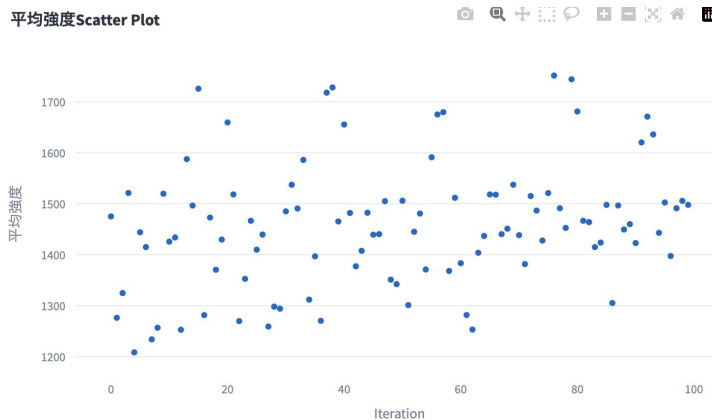
降伏強度Scatter Plot



引張強度Scatter Plot



平均強度Scatter Plot



- Scatter Plot of trials interaction and each target

Streamlit - Visualization

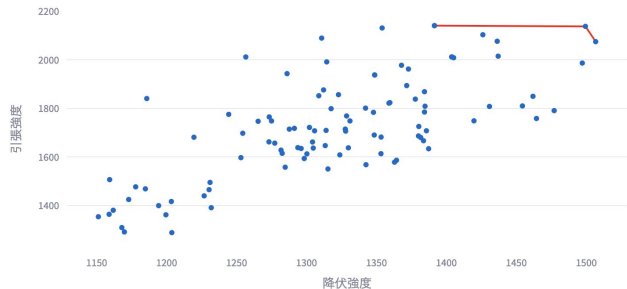


Select Two Targets

降伏強度 × 引張強度 ×



Pareto Curve(2D)



	ブデン	バナジウム	窒素	ニオブ	コバルト	タングステン	アルミニウム	チタン	best_trial
0	5.16	1.16	0.14	0.0354	7.0088	0.1613	0.2391	0.3109	1
1	5.16	1.16	0.14	0.0354	7.0088	0.1613	0.2391	0.3109	1
2	5.59	3.51	0.01	0.0354	7.0088	0.1613	0.2391	0.3109	1
3	0.79	2.48	0.06	0.0354	7.0088	0.1613	0.2391	0.3109	1
4	5.25	2.19	0	0.0354	7.0088	0.1613	0.2391	0.3109	0
5	2.84	0.94	0	0.0354	7.0088	0.1613	0.2391	0.3109	0
6	4.15	2.86	0.11	0.0354	7.0088	0.1613	0.2391	0.3109	0
7	6.27	3.69	0.08	0.0354	7.0088	0.1613	0.2391	0.3109	0
8	3.98	0.48	0	0.0354	7.0088	0.1613	0.2391	0.3109	0
9	8.67	0.38	0.1	0.0354	7.0088	0.1613	0.2391	0.3109	0

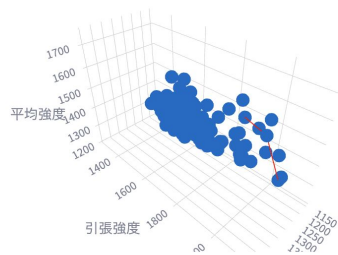
Download data as CSV

Select Three Targets

降伏強度 × 引張強度 × 平均強度 ×



Pareto Curve(3D)



- Two targets combination(2D Pareto Curve)
- Three targets combination (3D Pareto Curve)
- Optimized samples will be showed on top(best_trial=1)

DataRobot