



人工智能边缘端应用开发

DL Workbench模型分析

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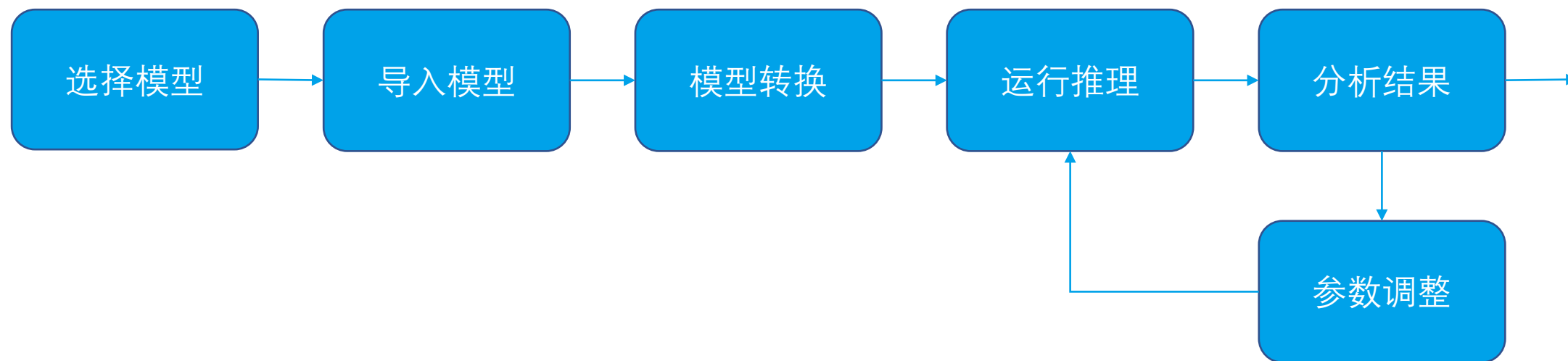
OpenVINO & Docker

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DL Workbench模型分析

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人脸识别程序开发



- 根据任务需求选择训练好的**模型**，下载或导入模型
- 通过**模型优化器**运行训练好的模型，将模型转换为中间表示文件（IR），由一对.xml和.bin文件组成，作为推理引擎（IECore）的输入。
- 生成随机**数据集**，创建工作项目
- 对中间表示（优化的模型）运行**推理**并输出推理结果

模型分析流程：

- 启动深度学习工作平台（DL Workbench）服务端
- 导入OpenVINO IR模型
- 调整输入模型和输出模型的相应参数
- 利用深度学习工作平台对模型网络进行可视化操作
- 提取网络中不同节点的对应属性信息



2.1 启动深度学习工作平台 (DL Workbench)

1. 验证容器镜像:

打开终端, 运行命令:

\$ docker images

```
vkrobot@vkrobot:~$ docker images
REPOSITORY          TAG         IMAGE ID      CREATED        SIZE
vkaibot openvino2021  latest       8ec1514d27fd  4 weeks ago   9.65GB
openvino/workbench  latest     3ecda0d86f11  2 months ago  7.61GB
```

2. 运行启动脚本:

切换至工作目录:

\$ cd ~/vkaibot_ncs/dl_workbench

运行启动脚本:

\$./start_workbench.sh -IMAGE_NAME openvino/workbench -TAG latest

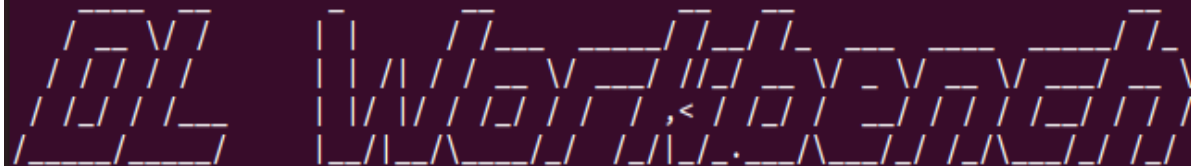
3. 登录网页工作平台:

启动脚本运行完成后会提供一个本地网址IP以及Token, 打开浏览器使用该信息登录DL Workbench



2.1 启动深度学习工作平台 (DL Workbench)

```
1 node online.  
/usr/local/lib/python3.6/dist-packages/sqlalchemy/orm/mapper.py:1881: SAWarning: Implicitly combining column jobs.project_id with column project_report_export_job.project_id under attribute 'project_id'. Please configure one or more attributes for these same-named columns explicitly.  
  util.warn(msg)  
19:49:27 accuracy_checker WARNING: /usr/local/lib/python3.6/dist-packages/sqlalchemy/dialects/postgresql/base.py:2408: SADeprecationWarning: The create_engine.convert_unicode parameter and corresponding dialect-level parameters are deprecated, and will be removed in a future release. Modern DBAPIs support Python Unicode natively and this parameter is unnecessary.  
  default.DefaultDialect.__init__(self, **kwargs)  
  
19:49:28 accuracy_checker WARNING: /usr/local/lib/python3.6/dist-packages/flask_sqlalchemy/__init__.py:157: SADeprecationWarning: Use .persist_selectable  
  info = getattr(mapper.mapped_table, 'info', {})
```



DL Workbench version: 1.0.3357.4646b582

Login token: 92fd20402bc815e091a23b6a0ba1f11a8d0153afa31ee64e56cfbb3b37eeb166

DL Workbench is available at: <http://127.0.0.1:5665/?token=2167f56195882a654777f21366355014ff407ccac90b43c8669ed25e0f9437f3>




Note: authentication via this link is available only once.


After login, it will expire and new link will be generated.





2.2 深度学习工作平台 (DL Workbench)

创建新配置 (Configuration) :

 |  

Active Configurations Create 

 No data available. Create a configuration by importing a model and a dataset to profile with.



Analyze

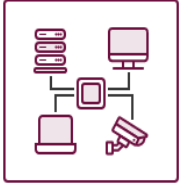
CPU

VPU

GPU

HDDL


Optimize


Deploy

#	Model	Dataset	Machine	Device	Precisions	Creation Time
No data available, create configuration first						

Retain your privacy and help us improve. Please accept cookies so we can track anonymous usage data. Thank you.

Accept

Block

[More Information](#)

导入IR模型：

- 模型位置

~/vkaibot_ncs/ov_workspace/face_detection/model

- IR模型文件包含一个.xml和一个.bin共两个文件
- 导入过程中根据模型不同可能需要调整输入参数，如色彩空间以及输入维度

[← Back to Create Configuration](#)

Import Model

1. Import

Open Model Zoo

Original Model

Framework:

OpenVINO IR

IR XML file: ⓘ

Choose File

face-detection-0204.xml

IR BIN file: ⓘ

Choose File

face-detection-0204.bin

Model name: ⓘ

face-detection

Cancel

Import Model

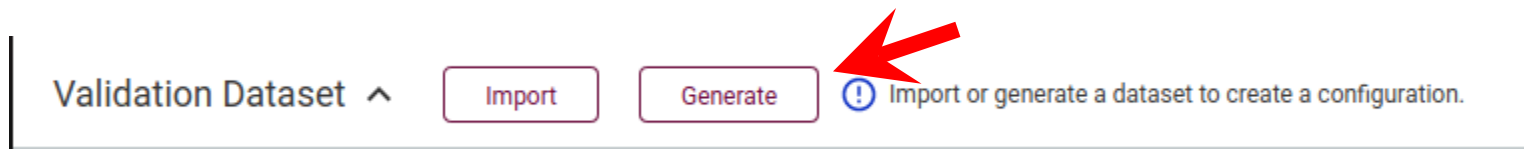
2. Convert Model to IR



2.2 深度学习工作平台 (DL Workbench)

生成检验数据集：

- 在检验数据集 (Validation Dataset) 一栏，点击生成 (Generate) 按钮
- 配置完成后点击生成 (Generate) 即可创建一个随机的检验数据集



数据集

Autogenerate Dataset

生成的图像数

像素

Number of Images to generate: 1 2000 100

Image Dimensions: Width: 224 px Height: 224 px

Autogenerate Dataset Tips

Autogenerated datasets comprise noise images and do not include annotations.

Because autogenerated datasets are made of noise images and do not contain annotations, they cannot be used for accuracy measurement and calibration.

Generated dataset image example (100×100):





创建配置 (Configuration) :

- 选择模型, 环境 (CPU), 验证数据集
- 选择完成后点击创建 (Create) 按钮创建该配置

Configuration Details

- ✓ Model: face-detection
- ✓ Target: Local Workstation
- ✓ Environment: Intel(R) Core(TM) i7-8750H CPU @ 2.20GHz
- ✓ Dataset: Autogen-dataset1

Model ^ ⓘ Import a model to create a configuration.

Model Name
face-detection Details

环境 Environment v

Validation Dataset ^ ⓘ Import or generate a dataset to create a c

Dataset Name	Date ↓
Autogen-dataset1	15/03/21, 02:58

Red arrows indicate the sequence of steps: 1 points to the 'face-detection' model row, 2 points to the 'Environment' dropdown, 3 points to the 'Autogen-dataset1' dataset row, and 4 points to the 'Create' button.

2.3 深度学习工作平台 (DL Workbench)

- 点击导入模型右侧的详细 (Details) 按钮即可显示当前模型的详细配置信息，如环境信息，模型参数等
- 模型参数中还包括当前模型的色彩空间，输入维度等重要信息

Configurations Settings

#	Model	Optimization	Validation Dataset	Target	Best Throughput (FPS)	Respective Latency (ms)	Accuracy
1	face-detection	Details	Autogen-dataset1	Machine: Local Workstation Device: CPU	95.81	9.46	N/A ⓘ

[Compare](#)

Selected Configuration

face-detection · Autogen-dataset1 · Local Workstation · CPU

Configuration

face-detection

face-detection · Autogen-dataset1 · Local Workstation · CPU
Creation Time: 15/03/21, 02:08

Environment Details

- Platform Tag: Local Workstation
- Processor Family: 8th Generation Intel(R) Core...
- Processor Numbers: Core i7-8750H
- Processor Cores: 4

Conversion Settings

- 框架 ⓘ Framework: OpenVINO IR
- ir 版本 ⓘ IR Version: 10
- 精度 ⓘ Precision: FP32
- ir 色彩空间 ⓘ IR Color Space: BGR
- ⓘ Original Color Space: RGB

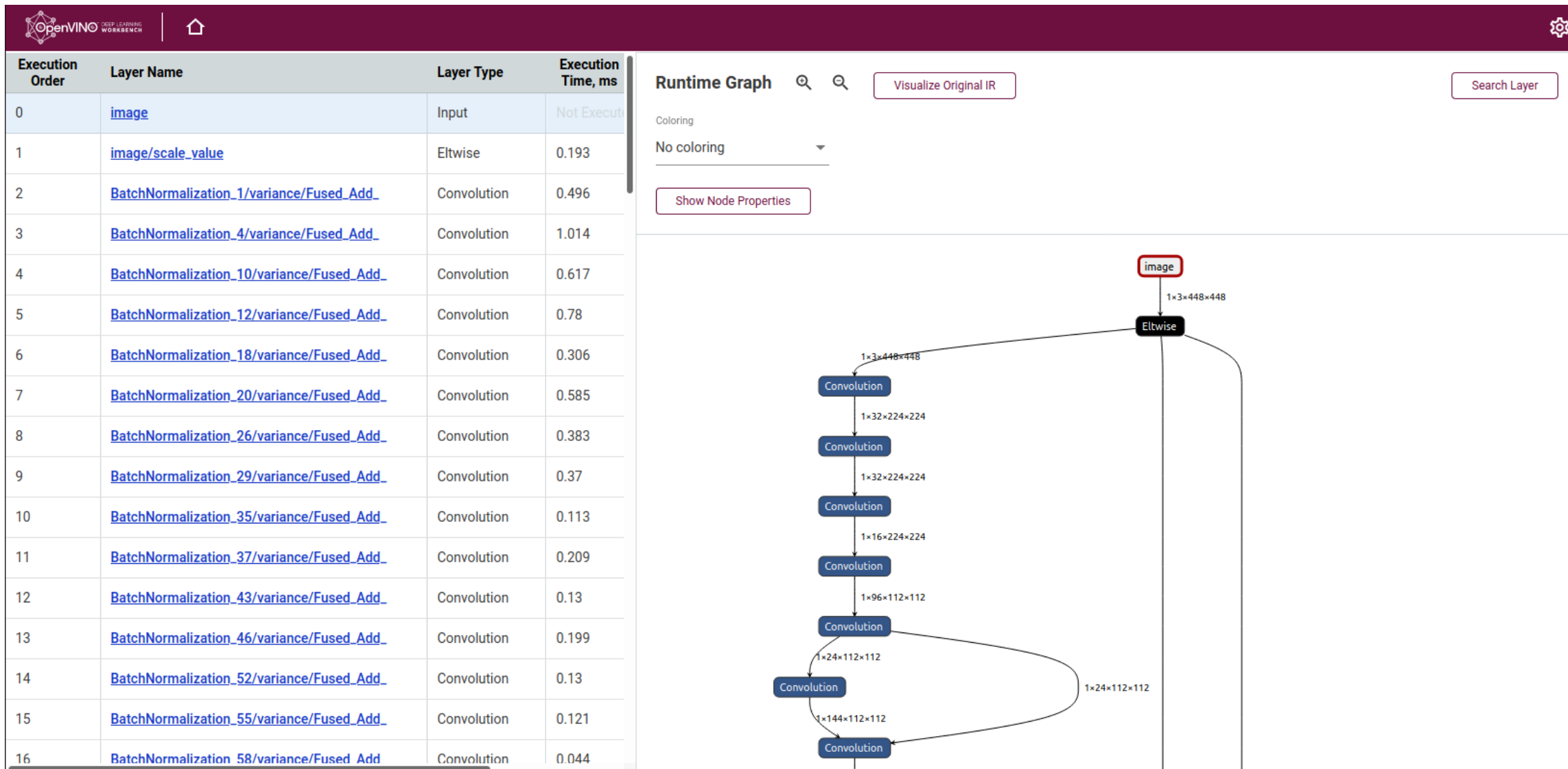
Advanced

- ⓘ Operations Set: [opset1](#), [opset3](#)
- ⓘ Input: image
- ⓘ Shape: (1,3,448,448)
- ⓘ Scales: image(255.0)



2.4 深度学习工作平台 (DL Workbench)

- 显示模型网络层级以及网络可视化





2.4 深度学习工作平台 (DL Workbench)

- 点击左侧层级列表或网络图中的任意节点，再点击显示节点属性 (Show Node Properties) 按钮即可显示该节点的详细属性

The screenshot displays the DL Workbench interface. On the left, a table lists layers with their execution order, names, types, and times. The first layer, 'image/scale_value', is highlighted with a red box. In the center, the 'Runtime Graph' shows a sequence of operations: 'image' (1x3x448x448) followed by five 'Convolution' nodes with decreasing dimensions. The first 'Eltwise' node is highlighted with a red box. A red arrow points from the 'Show Node Properties' button to this 'Eltwise' node. On the right, the 'NODE PROPERTIES' panel for the 'image/scale_value' node is shown, detailing its attributes and inputs/outputs.

Execution Order	Layer Name	Layer Type	Execution Time, ms
1	image/scale_value	Eltwise	0.193
2	BatchNormalization_1/variant/Fused_Add	Convolution	0.496
3	BatchNormalization_4/variant/Fused_Add	Convolution	1.014
4	BatchNormalization_10/variant/Fused_Add	Convolution	0.617
5	BatchNormalization_12/variant/Fused_Add	Convolution	0.78
6	BatchNormalization_18/variant/Fused_Add	Convolution	0.306
7	BatchNormalization_20/variant/Fused_Add	Convolution	0.585
8	BatchNormalization_26/variant/Fused_Add	Convolution	0.383
9	BatchNormalization_29/variant/Fused_Add	Convolution	0.37
10	BatchNormalization_35/variant/Fused_Add	Convolution	0.113
11	BatchNormalization_37/variant/Fused_Add	Convolution	0.209
12	BatchNormalization_43/variant/Fused_Add	Convolution	0.13
13	BatchNormalization_46/variant/Fused_Add	Convolution	0.199
14	BatchNormalization_52/variant/Fused_Add	Convolution	0.13
15	BatchNormalization_55/variant/Fused_Add	Convolution	0.121
16	BatchNormalization_58/variant/Fused_Add	Convolution	0.044
17	BatchNormalization_61/variant/Fused_Add	Convolution	0.066

Runtime Graph

Coloring: No coloring

Visualize Original IR

Search Layer

Show Node Properties

NODE PROPERTIES

type: Eltwise

name: image/scale_value

ATTRIBUTES

execOrder: 1

execTimeMcs: 193

originalLayersNa...: image/scale_value

outputLayouts: nchw

outputPrecisions: FP32

primitiveType: jit_avx2_i8

INPUTS

input: name: 0:0

OUTPUTS

output: name: 1:1



Thanks

