Future Vision Transport

Conception d'une voiture autonome

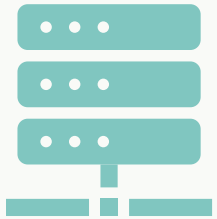
Segmentation sémantique

CITYSCAPES DATASET

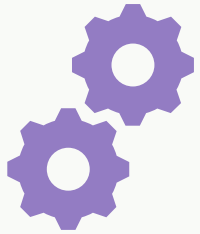
Sommaire

Contexte

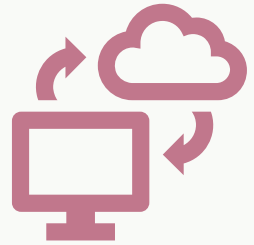
Récupération des masques



Générateur de données



Modélisation



Azure

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Contexte

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Contexte

Conception d’une voiture autonome

Segmentation des images

Jeu de données CityScapes

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CityScapes Dataset

5000 images

34 classes

8 classes finales

Démarche

Récupération des masques (CityScapes-dataset)

Générateur de données

Modélisation

Entrainement / Déploiement Azure (MLOps)

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Récupération des masques

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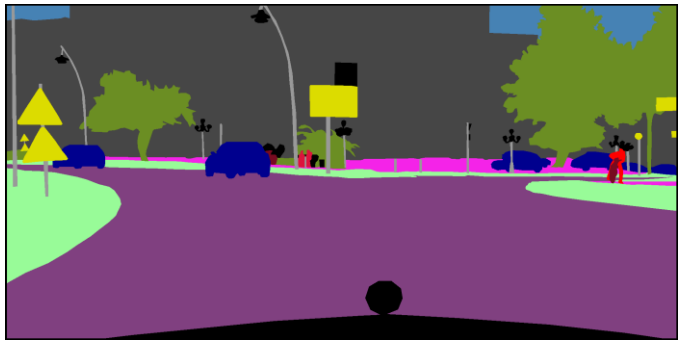
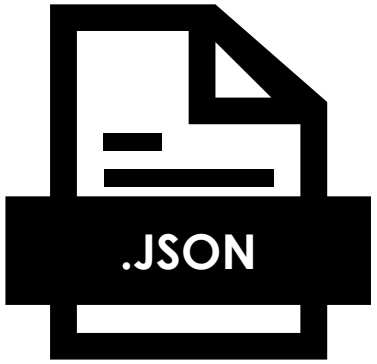
Masques du jeu de données

Nuance gris (1channel) => 34 classes



RGB (3 channel) => 34 classes



Polygone => 34 classes

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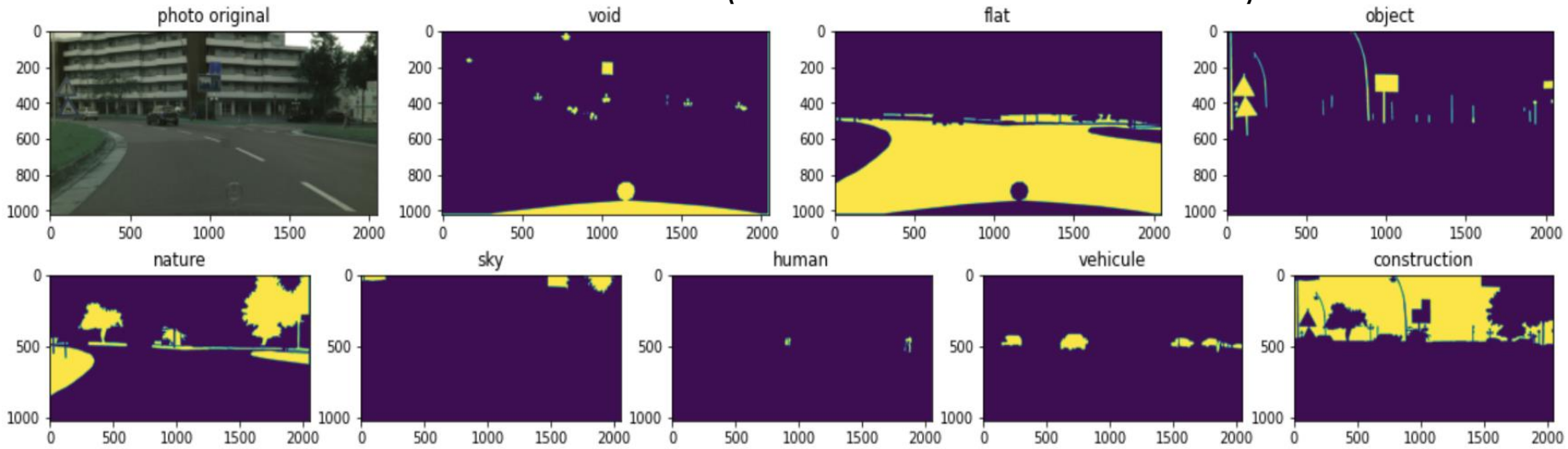
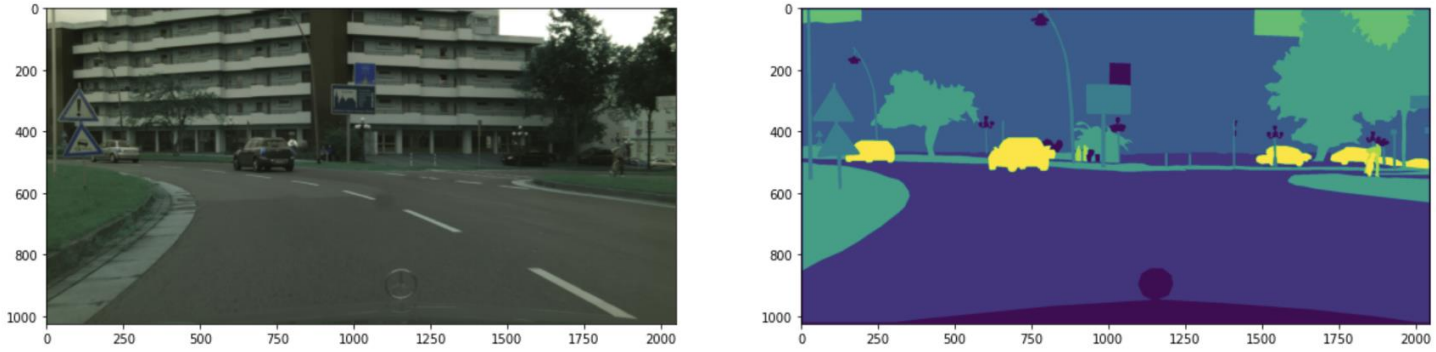
Masque final (8 classes)

One hot encoder (8 channel 2 classes => 0/1)



Label encoder (1 channel 8 classes)



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Benchmark des différentes solutions

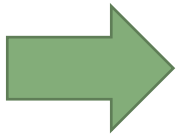
	label_ids	json_file	gain_seconde_labelid_vs_json
label_encoder	0.1946	0.8548	0.6602
one_hot_encoder	0.1876	4.5758	4.3882

Générateur de données

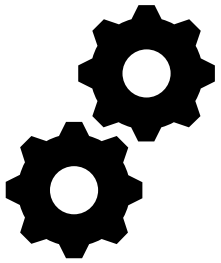
Générateur de données

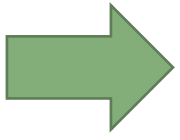
./data/inputs/xxxx.png
...
./data/inputs/xxxx.png

./data/outputs/xxxx.png
...
./data/outputs/xxxx.png

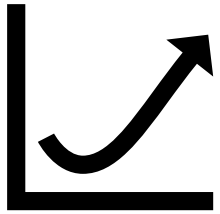


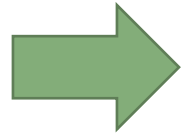
Générateur



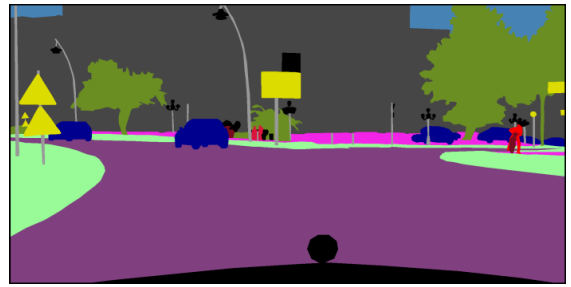


Modèle





Prédiction



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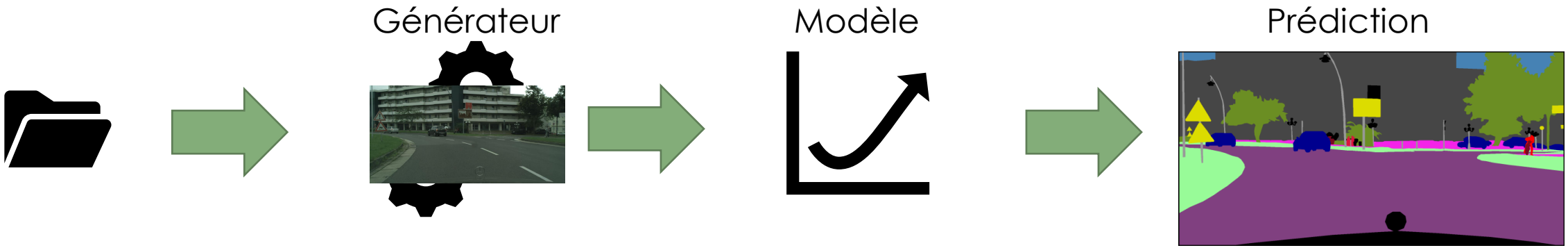
Générateur de données



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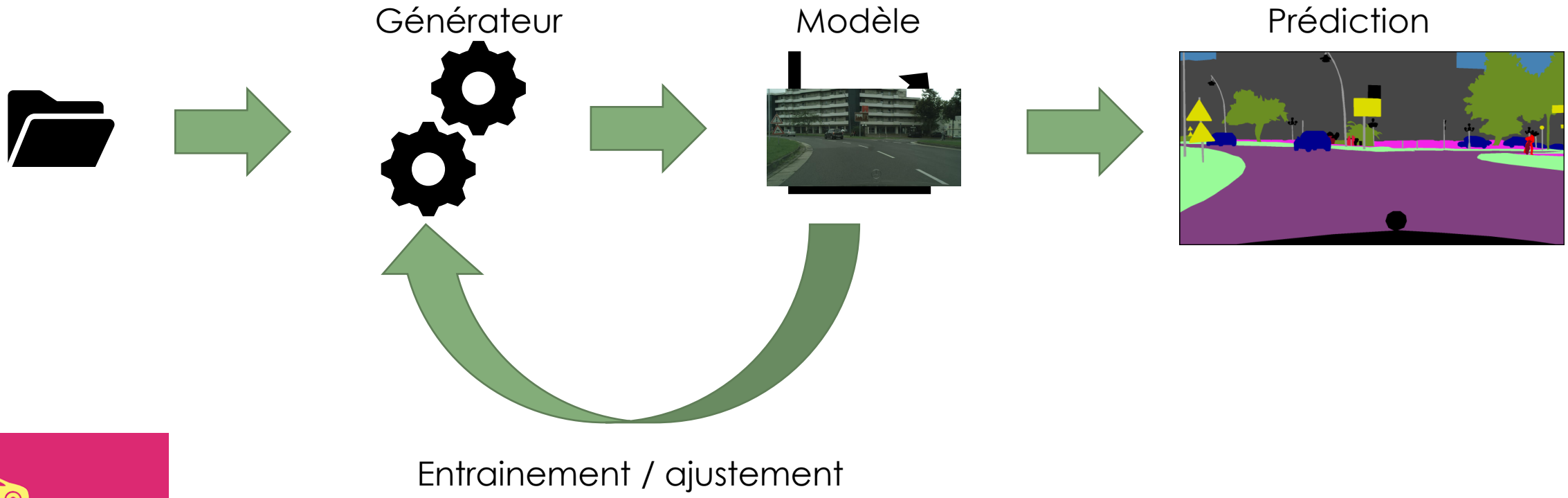
Générateur de données



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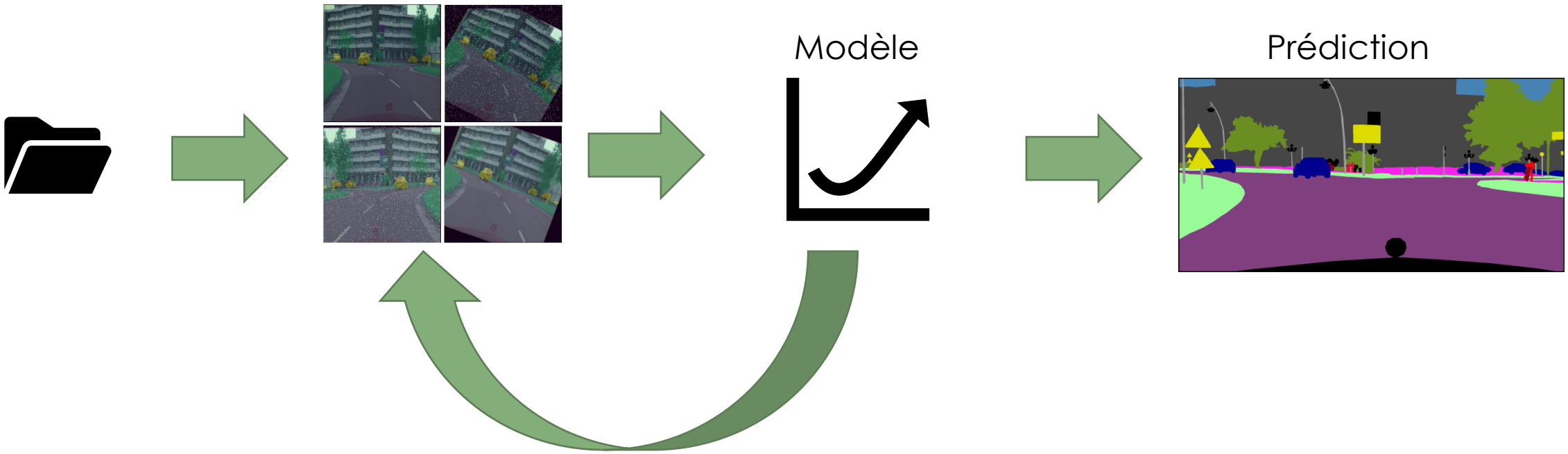
Générateur de données (augmentation données)



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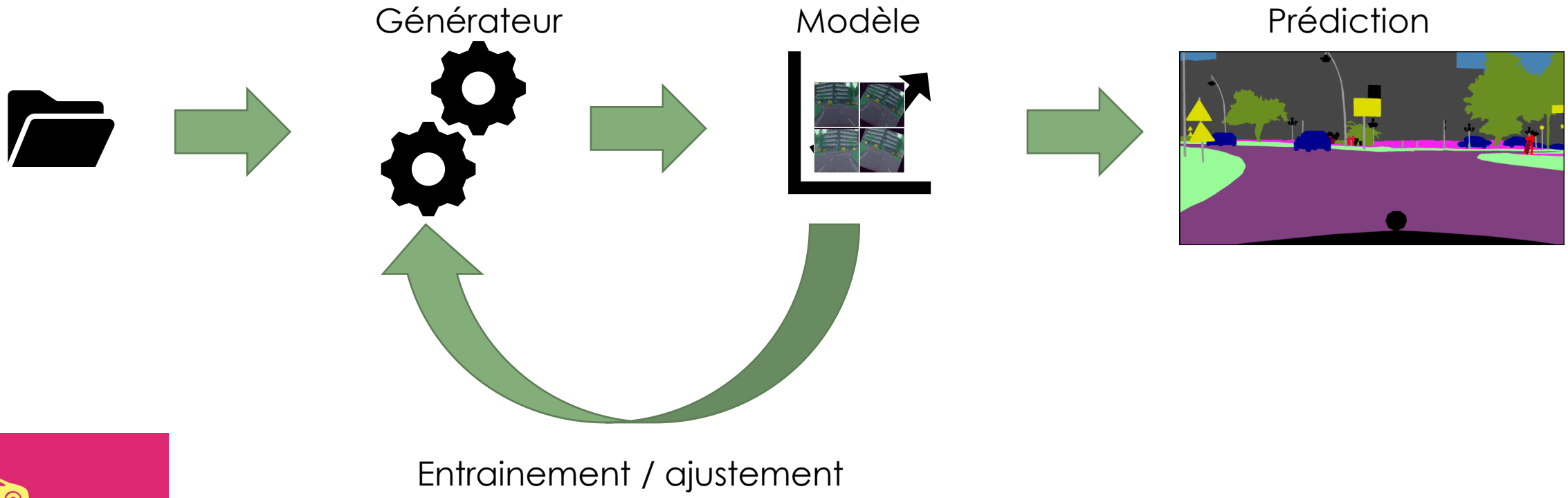
Générateur de données (augmentation données)



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Modélisation

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Différentes modélisations réalisé

- Machine learning (modélisation linéaire)
- UNet
- UNet avec Augmentation des données
- Transfert Learning Unet (ResNet50 / VGG16)
- FPN transfert learning (EfficientNetb3)

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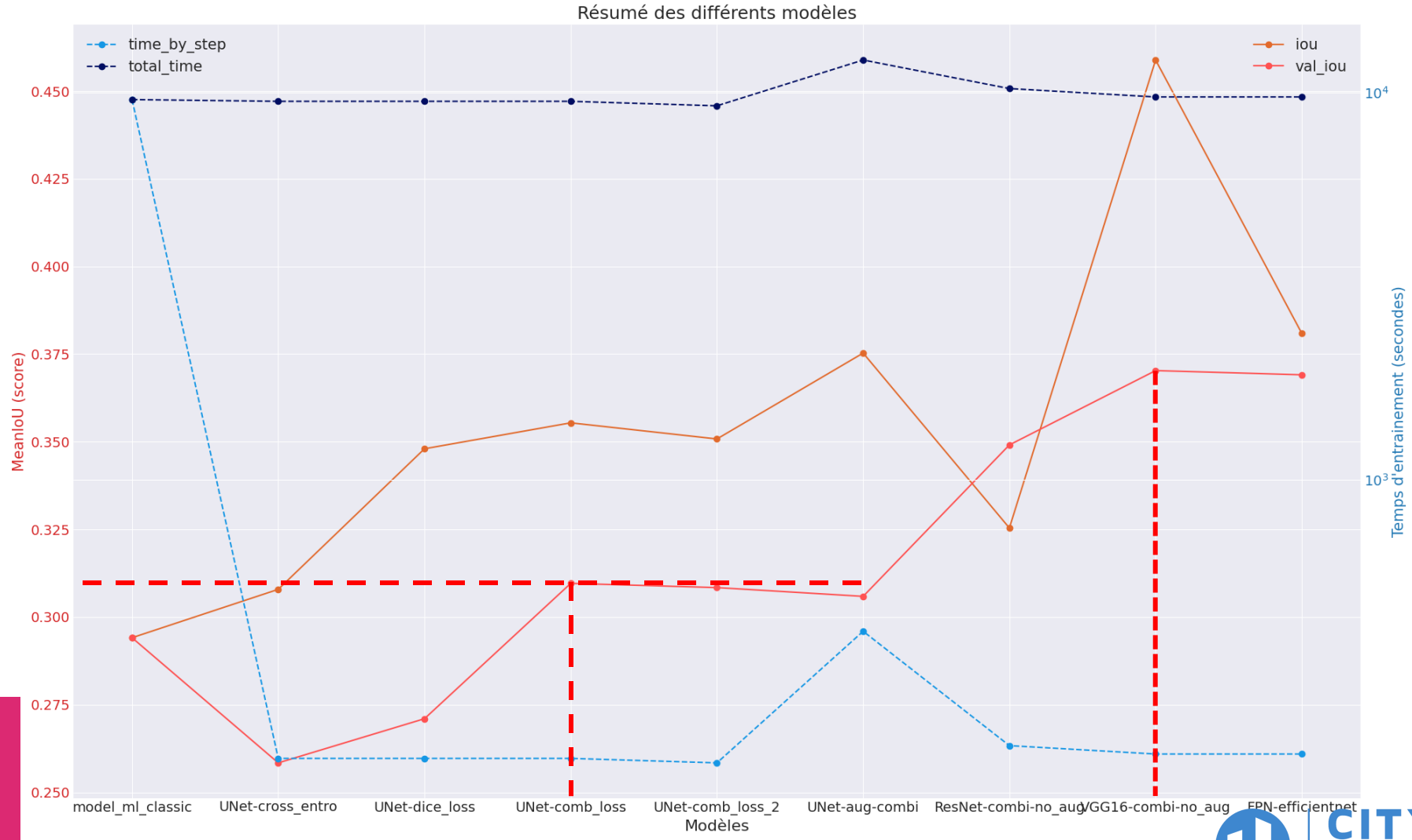
Synthèse des modélisations



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Azure

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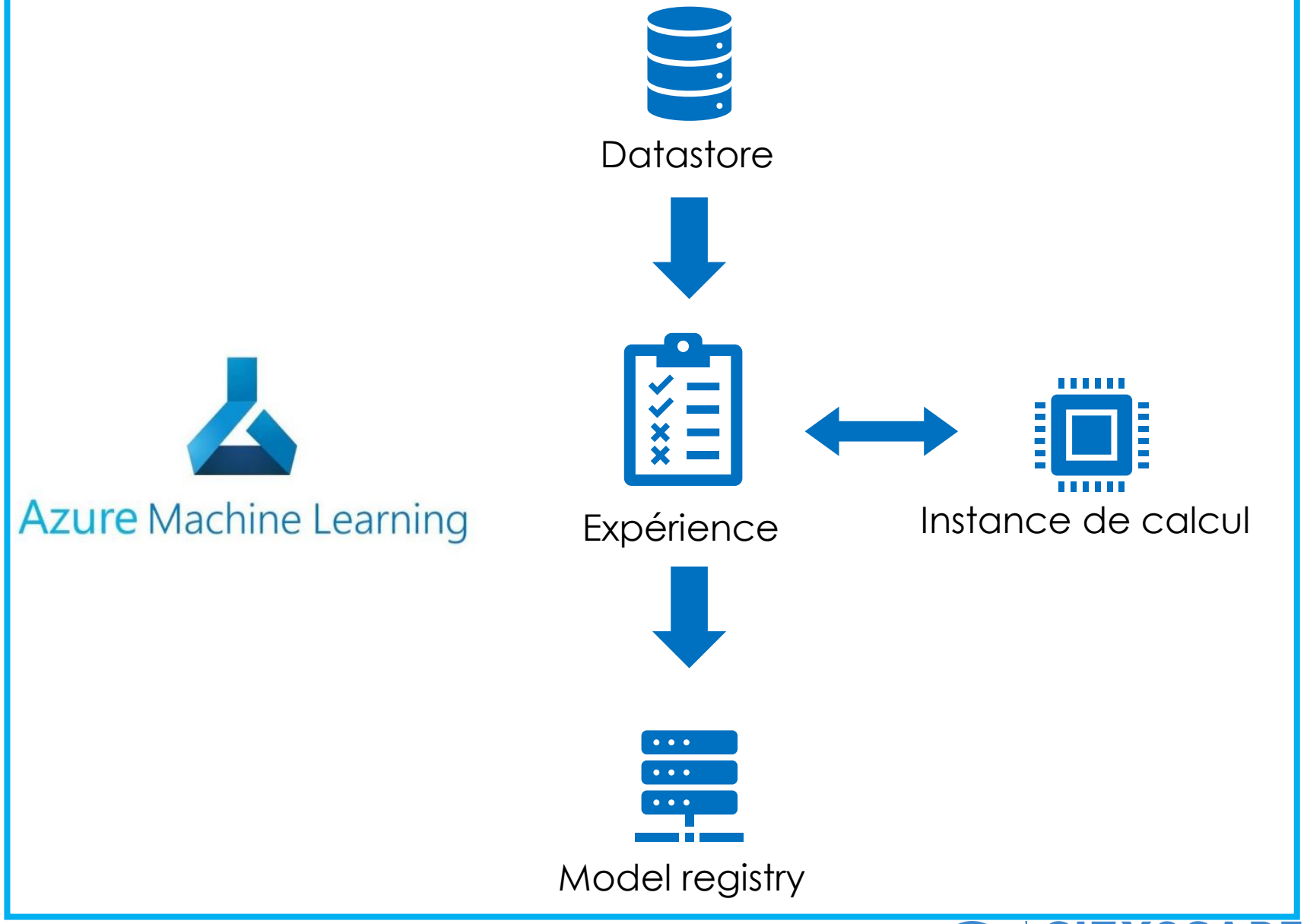
Entrainement

Script d'entrainement



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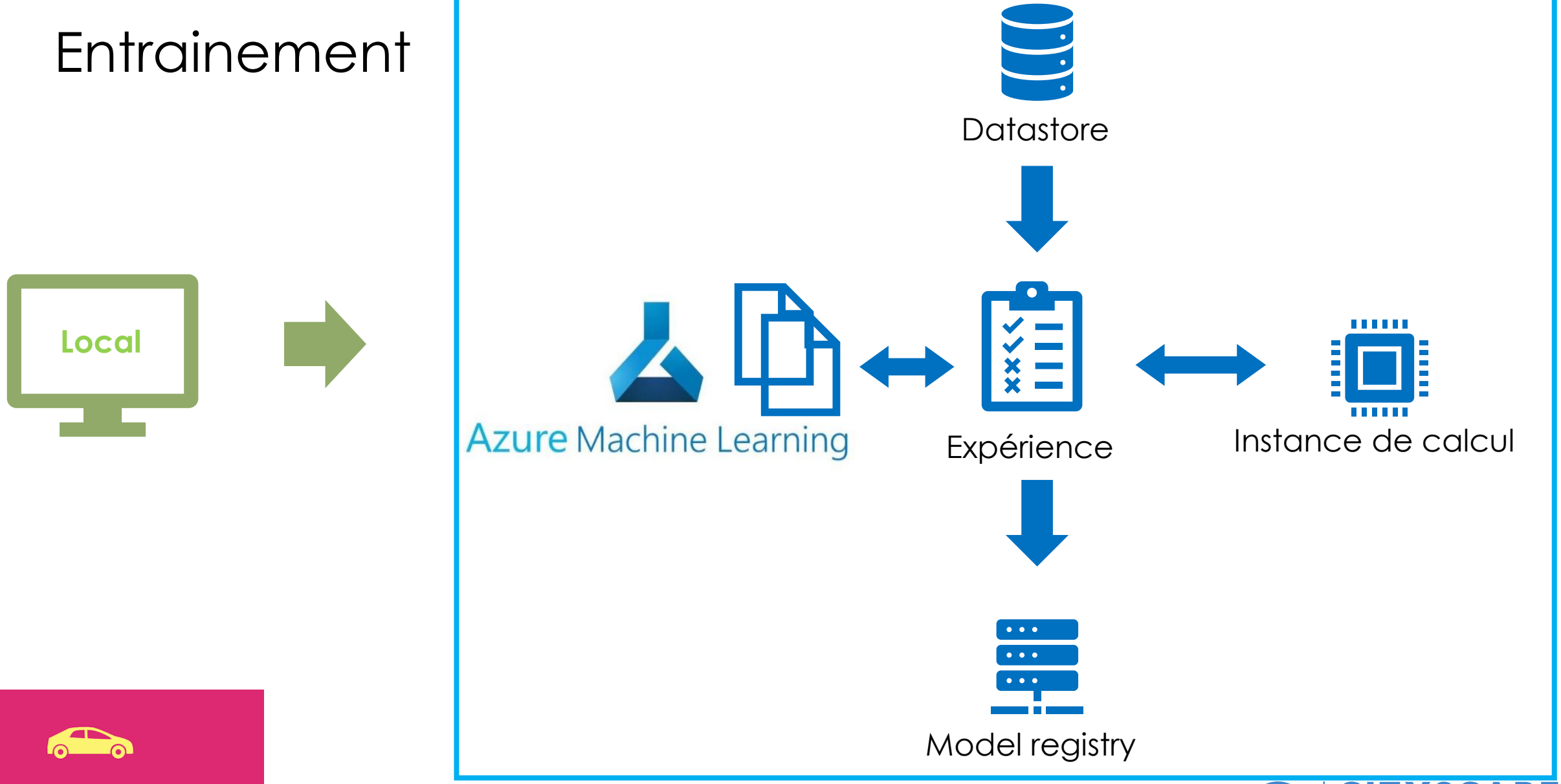
Entrainement



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Entrainement

```
from azureml.core import Workspace, Experiment, Environment, ScriptRunConfig

experiment = Experiment(workspace=ws, name='experiment_train_tensorflow')

config = ScriptRunConfig(source_directory='./src',
                         script='train.py',
                         compute_target='train-model-fvt')

env_tf = ws.environments['AzureML-tensorflow-2.4-ubuntu18.04-py37-cuda11-gpu']

config.run_config.environment = env_tf

run = experiment.submit(config)

run.wait_for_completion(show_output=True)
```

Déploiement (ACI)

```
from azureml.core.environment import Environment
from azureml.core.model import InferenceConfig, Model
from azureml.core.webservice import AciWebservice, Webservice

env_tf = ws.environments['AzureML-tensorflow-2.4-ubuntu18.04-py37-cpu-inference']


inference_config = InferenceConfig(source_directory=source_directory,
                                   entry_script="x/y/score.py",
                                   environment=env_tf)

deployment_config = AciWebservice.deploy_configuration(cpu_cores = 2, memory_gb = 4,auth_enabled=True)

service = Model.deploy(
    workspace = ws,
    name = "semantic-segmentation",
    models = [final_model],
    inference_config = inference_config,
    deployment_config = deployment_config)

service.wait_for_deployment(show_output = True)
```

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Déploiement (ACI)

```
input_payload = json.dumps({
    'id':1
})

output = service.run(input_payload)
output = np.array(output)

============ OUTPUT ==============
array([[[ 59,  60,  57],
        [ 57,  59,  55],
        [ 55,  57,  53],
        ...,
        [ 38,  43,  40],
        [ 38,  43,  40],
        [ 38,  43,  40]]])
```

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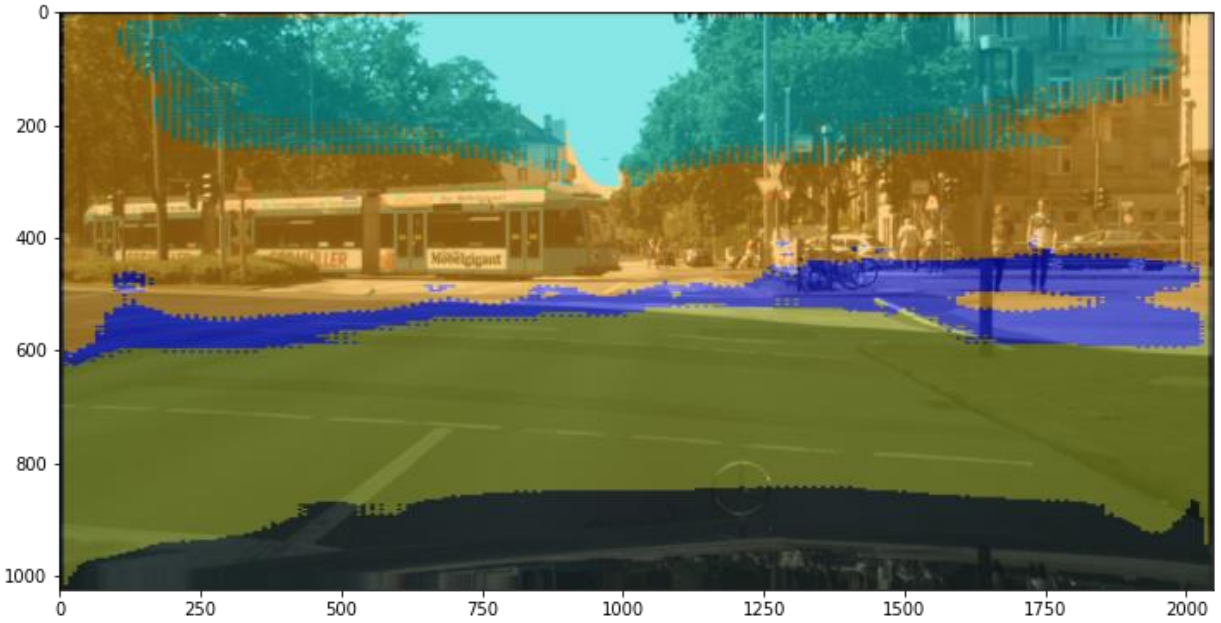
Déploiement (ACI)

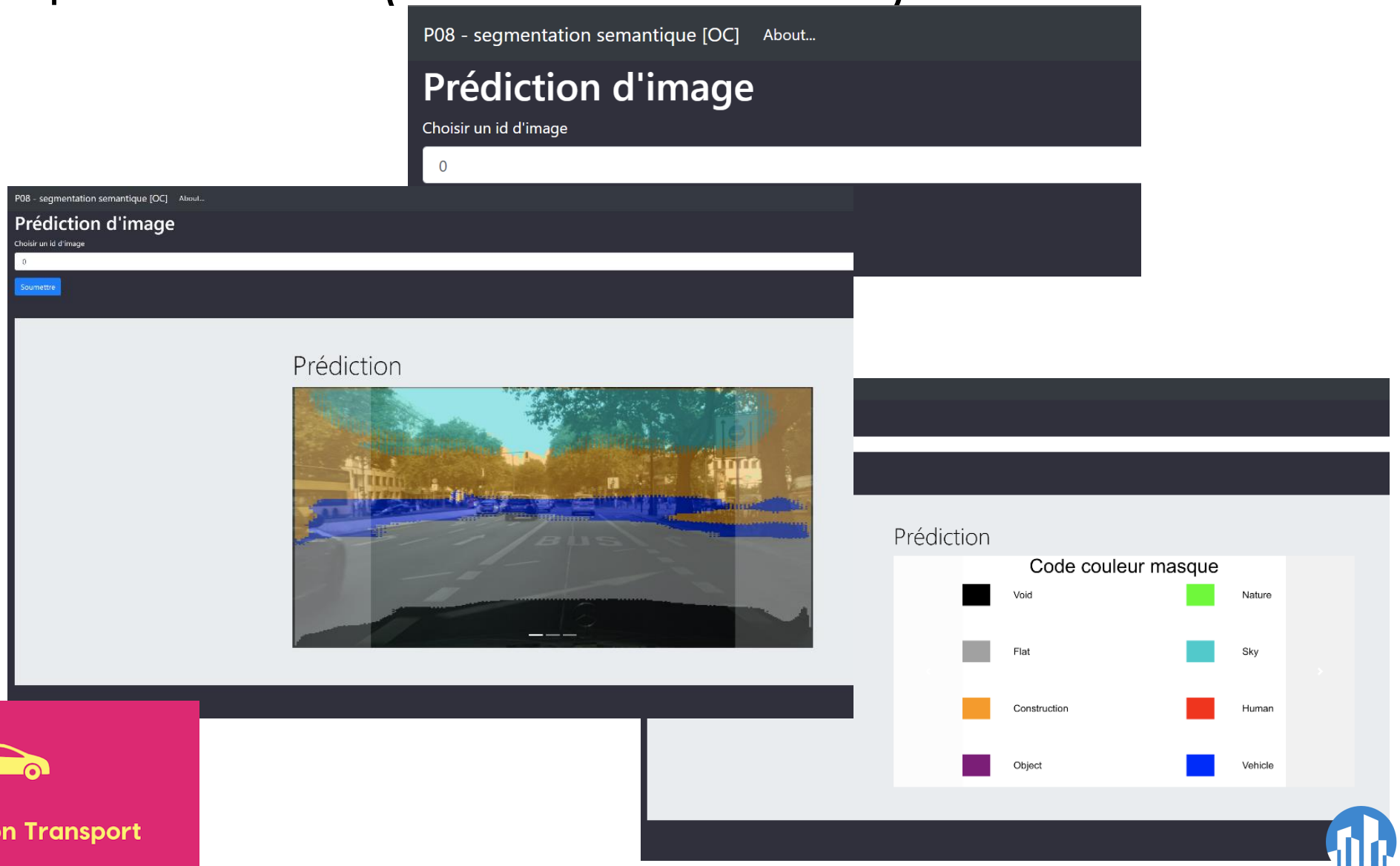
```
plt.figure(figsize=(12,10))
plt.imshow(output)
```



Déploiement (Web APP / Flask)

Azure Web App

Déploiement (Web APP / Flask)



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Démonstration Flask

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Conclusion

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Conclusion

Performance du modèle

Optimisation des paramètres
Augmenter la taille des images
Augmenter le nombre d'images initial
Modification du transformateur imgaug

MLOps à automatiser

Mise a jour Datastore
Déploiement / entrainement

Merci de votre attention, avez-vous des questions ?