



MONAI on AWS

Short introduction and resources to get you started



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Our mission at AWS

Put machine learning in the
hands of every researcher, data scientist,
and developer

MONAI on AWS

Options to use MONAI

1

AWS Deep Learning AMIs & Deep Learning Containers

- Preconfigured environments and containers that come with popular DL frameworks
- Include NVIDIA CUDA, cuDNN, and Intel acceleration libraries

2

Amazon SageMaker

- Fully managed, modular Machine Learning service
- More than 20 components such as labeling, Jupyter notebooks, training & inference clusters, distributed training libraries, a CI/CD service
- Accessible via an integrated IDE, APIs and SDKs

3

Augment your on-prem GPUs with 1 and 2

- Use the cloud to scale out
- Train full-sized models in the cloud



A100, V100, T4, K80
GPUs

Registry of Open Data on AWS

Registry of Open Data on AWS



Medical Segmentation Decathlon

computed tomography health imaging life sciences magnetic resonance imaging medicine nifti segmentation

Description

With recent advances in machine learning, semantic segmentation algorithms are becoming increasingly general purpose and translatable to unseen tasks. Many key algorithmic advances in the field of medical imaging are commonly validated on a small number of tasks, limiting our understanding of the generalisability of the proposed contributions. A model which works out-of-the-box on many tasks, in the spirit of AutoML, would have a tremendous impact on healthcare. The field of medical imaging is also missing a fully open source and comprehensive benchmark for general purpose algorithmic validation and testing covering a large span of challenges, such as: small data, unbalanced labels, large-ranging object scales, multi-class labels, and multimodal imaging, etc. This challenge and dataset aims to provide such resource thorough the open sourcing of large medical imaging datasets on several highly different tasks, and by standardising the analysis and validation process.

Update Frequency

This is a static dataset; however, tutorials and resources will be updated as they are developed.

License

[CC-BY-SA 4.0 International](#)

Documentation

<http://medicaldecathlon.com>

Managed By

[MONAI Development Team](#)

See all datasets managed by [MONAI Development Team](#).

Resources on AWS

Description

Ten tasks from the Medical Segmentation Decathlon Challenge. Tasks are organized by organ system and pathology, as follow, Liver Tumours; Brain Tumours; Hippocampus; Lung Tumours; Prostate; Cardiac; Pancreas Tumour; Colon Cancer; Hepatic Vasculature; Spleen. Tasks are provided in both tar.gz and uncompressed format.

Resource type

S3 Bucket

Amazon Resource Name (ARN)

`arn:aws:s3:::msd-for-monai`

AWS Region

`us-west-2`

AWS CLI Access (No AWS account required)

```
aws s3 ls s3://msd-for-monai/ --no-sign-request
```

Description

This is a mirror of `s3://msd-for-monai` in eu-west-2.

Resource type

S3 Bucket

Amazon Resource Name (ARN)

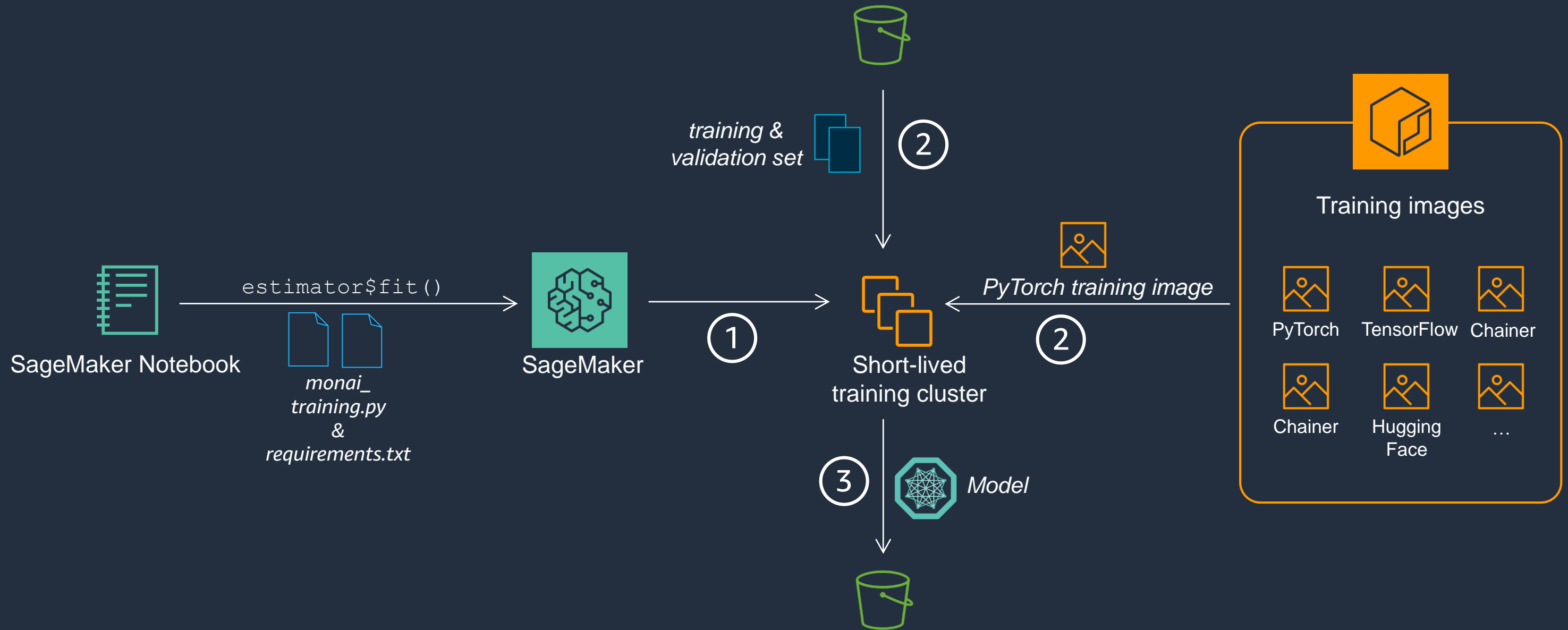
`arn:aws:s3:::msd-for-monai-eu`

AWS Region

- Allows researchers to publish & share public datasets
- Costs can be covered by the AWS Open Data Sponsorship Program

MONAI on Amazon SageMaker

SageMaker Managed Training



Benefits of using SageMaker in research

1/ Accelerated Research

Explore more architectures, explore more hyper parameters, explore more hypotheses compared to static infrastructure.

2/ Reproducible Workflows

Set up reproducible workflows not just for research but also for FDA approval processes.

3/ Improved Scaling

Start with a small group of people and quickly grow your team based on the underlying standardization.

4/ Financial Flexibility

Trade capital expenses for variable expenses.

MONAI on AWS

Resources to get you started

1

Launch an AWS Deep Learning AMI
with Amazon EC2

Train a Deep Learning model
with AWS Deep Learning Containers on Amazon EC2

Amazon SageMaker Technical Deep Dive Series
Amazon Web Services

<https://aws.amazon.com/getting-started/hands-on/train-deep-learning-model-aws-ec2-containers/>

<https://aws.amazon.com/getting-started/hands-on/get-started-dlami/>

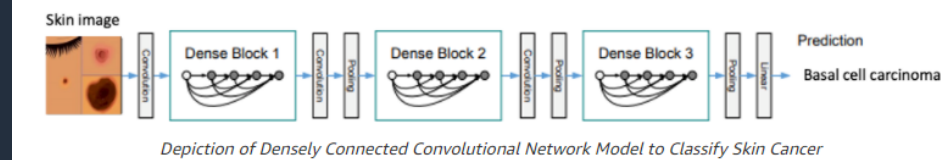
https://www.youtube.com/watch?v=uQc8ltd4UTs&list=PLhr1KZpdzukcOr_6j_zmSrvYnLUtgqsZz

2

Build a medical image analysis pipeline on Amazon SageMaker using the MONAI framework

by Bryan Marsh | on 14 DEC 2020 | in Amazon SageMaker, Healthcare, Industries | Permalink | Comments | Share

Medical imaging has transformed healthcare in a way that allows clinicians to identify diseases, make better diagnosis, and dramatically improve patient outcomes. Digital medical images have several modalities including ultrasound, X-ray, computed tomography (CT) scans and magnetic-resonance imaging (MRI) scans, positron emission tomography (PET) scans, retinal photography, histology slides, and dermoscopy images. Recent developments in deep learning algorithms, such as connected convolutional networks, are helping to identify and classify patterns in medical images that can supplement diagnostics and decision-making to offer clinicians insights into diseases, reduce costs and physician burn-out by automating repetitive tasks, and enable quicker triaging of patients with high-risk conditions.



<https://aws.amazon.com/blogs/industries/build-a-medical-image-analysis-pipeline-on-amazon-sagemaker-using-the-monai-framework/>

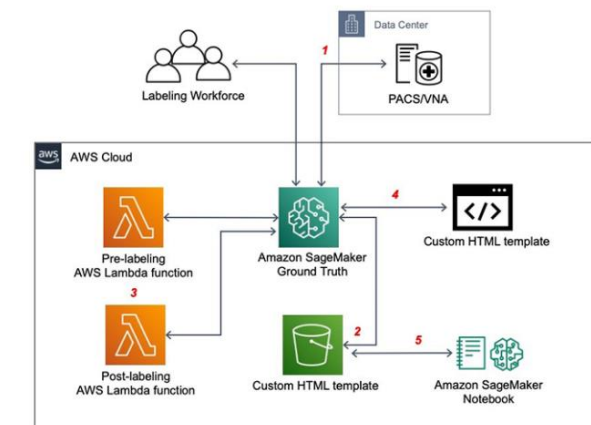
<https://github.com/aws-samples/amazon-sagemaker-monai-examples>

3

Annotate DICOM images and build an ML model using the MONAI framework on Amazon SageMaker

by Nihir Chadderwala, Bryan Marsh, and Gang Fu | on 04 JUN 2021 | in Amazon SageMaker, Artificial Intelligence, AWS Lambda, Healthcare, Industries | Permalink | Comments | Share

DICOM (Digital Imaging and Communications in Medicine) is an image format that contains visualizations of X-Rays and MRIs as well as any associated metadata. DICOM is the standard for medical professionals and healthcare researchers for visualizing and interpreting X-Rays and MRIs. The purpose of this post is to solve two problems:



<https://aws.amazon.com/blogs/machine-learning/annotate-dicom-images-and-build-an-ml-model-using-the-monai-framework-on-amazon-sagemaker/>

<https://github.com/aws-samples/annotate-medical-images-in-dicom-server-and-build-ml-models-on-amazon-sagemaker>

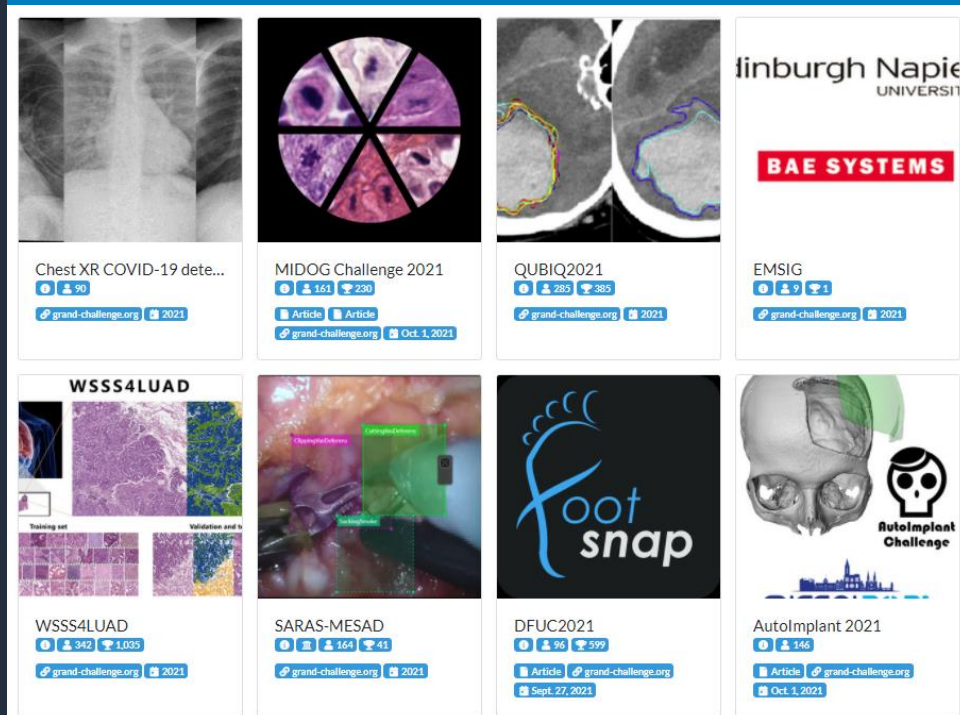
Grand-Challenge.org

Explore and join medical imaging ML challenges

Radboudumc

Grand Challenge

A platform for the end-to-end development of machine learning solutions in biomedical imaging

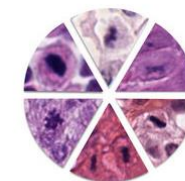


The screenshot displays a grid of medical imaging challenges on the Grand Challenge website. The challenges shown include:

- Chest XR COVID-19 dete...**: 90 participants, 2021.
- MIDOG Challenge 2021**: 161 participants, 230 teams, Oct. 1, 2021.
- QUBIQ2021**: 285 participants, 385 teams, 2021.
- EMSIG**: 9 participants, 9 teams, 2021.
- WSSS4LUAD**: 342 participants, 1,035 teams, 2021.
- SARAS-MESAD**: 164 participants, 41 teams, 2021.
- DFUC2021**: 96 participants, 599 teams, Sept. 27, 2021.
- Autolmplant Challenge**: 146 participants, Oct. 1, 2021.

<https://grand-challenge.org/>

MICCAI2021



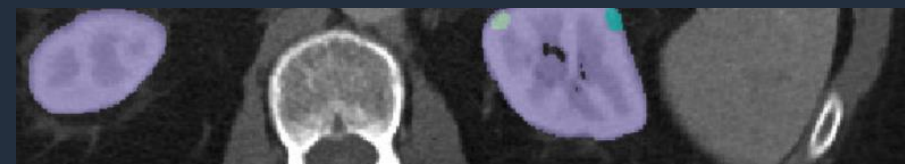
MIDOG 2021

Mitosis Domain Generalization Challenge

part of 



Learn2Reg 2021



The KiTS21 Challenge

For the 2021 iteration of the Kidney and Kidney Tumor Segmentation Challenge (KiTS), this site will be used only as a submission platform and leaderboard. Detailed information about this challenge can be found on:

Some logistics for the challenge day

- We will provide support for 280 participants
- We still have a couple of available slots
- Every TWO participants will share ONE AWS account
- EVERY participant will launch a dedicated SageMaker "Classic" Notebook instance. (We won't use SageMaker Studio)
- You will use the SageMaker notebooks for the entire project (We won't use separate training clusters)
- EACH SageMaker Notebook instance will be powered by a g4dn.2xlarge instance (NVIDIA T4 GPU with 16 GiB GPU Mem, 8x vCPU, 100GB EBS)
- We will share onboarding instructions and open the accounts 30min before the event (7:00AM PST / 4:00PM CEST / 8:30PM IST) via email. Instructions here:
<https://github.com/alex23lemm/monai2021bootcamp-aws-instructions/>
- Challenge participants will have the chance to win AWS credits

Good luck!

<https://aws.amazon.com/health/>