

Introduction to Codabench

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NSF HDR ML Challenge

Overview of challenges: <https://www.nsfhdr.org/mlchallenge>

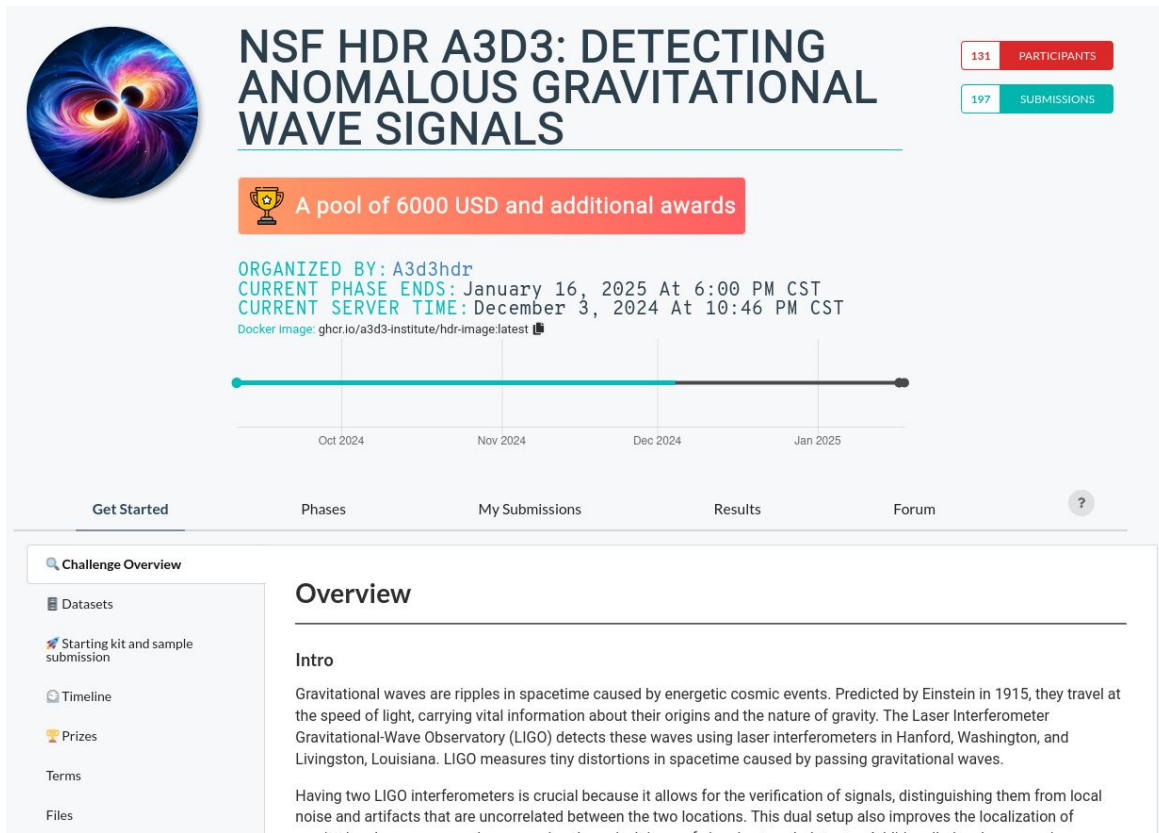


Challenges hosted on Codabench

What is Codabench?

- Open source platform to organize AI benchmarks
- Hosts competitions on these benchmark datasets

NSF HDR ML Challenges are hosted on Codabench as 3 independent challenges



NSF HDR A3D3: DETECTING ANOMALOUS GRAVITATIONAL WAVE SIGNALS

131 PARTICIPANTS
197 SUBMISSIONS

A pool of 6000 USD and additional awards

ORGANIZED BY: A3d3hdr
CURRENT PHASE ENDS: January 16, 2025 At 6:00 PM CST
CURRENT SERVER TIME: December 3, 2024 At 10:46 PM CST
Docker image: ghcr.io/a3d3-institute/hdr-image:latest

Oct 2024 Nov 2024 Dec 2024 Jan 2025

Get Started Phases My Submissions Results Forum

Challenge Overview

- Datasets
- Starting kit and sample submission
- Timeline
- Prizes
- Terms
- Files

Overview

Intro

Gravitational waves are ripples in spacetime caused by energetic cosmic events. Predicted by Einstein in 1915, they travel at the speed of light, carrying vital information about their origins and the nature of gravity. The Laser Interferometer Gravitational-Wave Observatory (LIGO) detects these waves using laser interferometers in Hanford, Washington, and Livingston, Louisiana. LIGO measures tiny distortions in spacetime caused by passing gravitational waves.

Having two LIGO interferometers is crucial because it allows for the verification of signals, distinguishing them from local noise and artifacts that are uncorrelated between the two locations. This dual setup also improves the localization of

Outline for today

- Register for ML Challenge
- Download data
- Create and submit dummy solution
- Hands-on work time

```
class Model:
    def __init__(self):
        """Inititalize the model"""
        pass

    def load(self):
        """Load the model from disk"""
        pass

    def predict(self, X):
        """Predict the probability scores for the given input examples"""
        return [0 for x_i in X]
```

Get Started Phases **My Submissions** Results Forum ?

You have not yet registered for this competition.

To participate in this competition, you must accept its specific [terms and conditions](#). This competition does not require approval, once you register, you will immediately be able to participate.

I accept the terms and conditions of the competition.

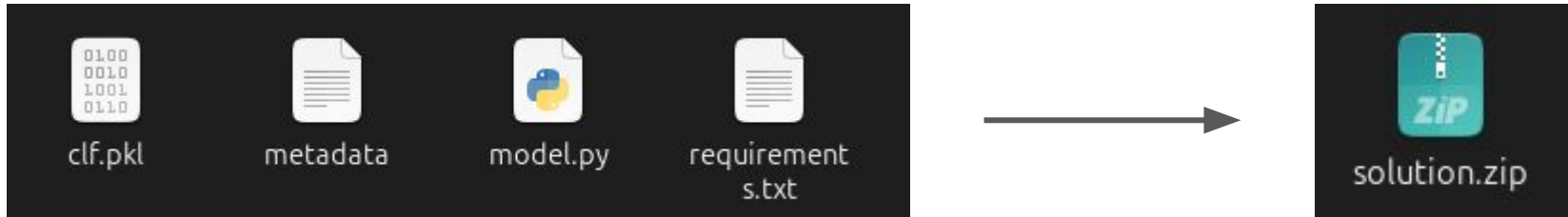
[Register](#)



<https://www.nsfhdr.org/mlchallenge>

Submitting a solution

- Each challenge has different input data and expected output
- Format of solution is similar across challenges
- Must submit zip file including at least **model.py**



Example via terminal:

```
zip solution.zip clf.pkl metadata model.py requirements.txt
```

Submitting a solution: `model.py`

- This file is mandatory
- Must define a class **Model**
- Required methods:
 - `__init__(self)`
 - `load(self)`
 - `predict(self, X)`
- Evaluation script runs:

```
from model import Model

model = Model()
model.load()
model.predict(X_test)
```

Dummy model for Gravitational Wave Challenge

```
class Model:
    def __init__(self):
        """Inititalize the model"""
        pass

    def load(self):
        """Load the model from disk"""
        pass

    def predict(self, X):
        """Predict the probability scores for the given input examples"""
        return [0 for x_i in X]
```

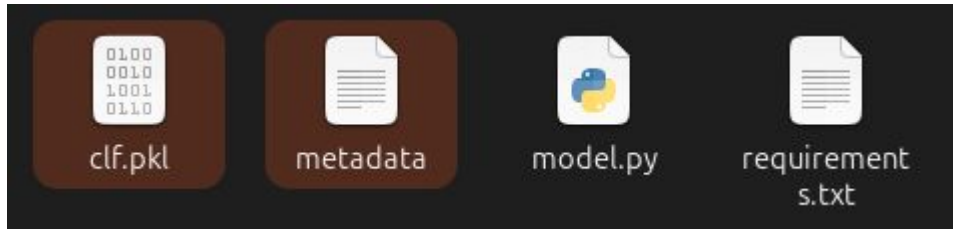
Submitting a solution: **requirements.txt**

- This file is optional
- Defines required python packages
- Packages are installed prior to running model
- Note: packages must be on whitelist
 - Packages can be added with admin approval

```
torch==2.3.0  
torchvision==0.18.0  
scikit-learn==1.4.2  
transformers==4.40.0
```

Submitting a solution: auxiliary files

- Submitted zip file may include additional files
- Files could include:
 - Configuration of model architecture (e.g. Keras json file)
 - Weights of model
- Example: your **Model.load()** method could use these files to instantiate and load the neural network weights
- Note: you will have to use absolute file paths, e.g.:
`os.path.join(__file__, "clf.pkl")`



Links

Indico page: <https://indico.cern.ch/event/1485495/>

Overview of challenges: <https://www.nsfhdr.org/mlchallenge>

Gravitational wave challenge:

Codabench: <https://www.codabench.org/competitions/2626/>

Github: <https://github.com/a3d3-institute/HDRchallenge/>

Hybrid Butterflies:

Codabench: <https://www.codabench.org/competitions/3764/>

Github: <https://github.com/Imageomics/HDR-anomaly-challenge-sample>

Tidal Fluctuations:

Codabench: <https://www.codabench.org/competitions/3223>

Link to indico and these slides

