

# **Graph Neural Networking challenge 2022:**

## **Instructions for the evaluation phase**

As described on the challenge website (<https://bnn.upc.edu/challenge/gnnnet2022/>), the evaluation will be based on the **Mean Absolute Percentage Error (MAPE)** metric computed on all the path delay predictions in the test dataset:

$$MAPE = \frac{100\%}{n} \sum_{i=1}^n \left| \frac{\hat{y}_i - y_i}{y_i} \right|$$

Particularly, we will measure the MAPE of the model checkpoints submitted by participants, which should include the training datasets used to train such models.

**The evaluation phase will start on Oct 3rd at 11:59:59 AM (GMT+2), and it will end on Oct 17th at 11:59:59 AM (GMT+2).**

## **Evaluation platform and test dataset**

The evaluation of the model's MAPE will be entirely done on the BNN evaluation platform. The test dataset is hidden from participants, it will not be publicly released. However, you can assume that **the samples of the test dataset will follow similar distributions to those of the validation dataset released at the beginning of the competition** (i.e., similar topology size, traffic ranges, link capacities, path lengths, delay distributions, etc).

During the evaluation phase, teams need to produce: (i) a training dataset, and (ii) a RouteNet-Fermi checkpoint resulting from the training. Afterward, they should generate a compressed ZIP file with the aforementioned resources and upload it to the BNN evaluation platform for automatically computing the score (see more details in Section "Prepare your submission").

**Please, access the BNN evaluation platform at this link:**

<https://challenge2022.bnn.upc.edu/evaluation>

If it is the first time you access the platform, you will need to create an account for your team. To do this, you should click on "Don't have an account?". **Please note that you can only register with the email address you entered as "Contact e-mail" when registering for the challenge.** Otherwise, you will get an error and the account will not be created. Likewise, only one account per team can be created. Note that, after the registration, you will receive an email that you need to confirm to verify the entered email address.

Once an account is created, you will be able to log in using the username and password specified in the registration form. **Please, remember that although you can register right now, the evaluation phase will take place from Oct 3rd at 11:59:59 AM (CET) to Oct 17th at 11:59:59 AM (CET).** Before and after this period you will not be able to submit files there. Each time you submit a new file, the platform will automatically start to compute the MAPE score. Note that it can take some time to compute the score and that only one solution can be simultaneously submitted per team. You will

receive an email with the result once the process is finished. We noticed that these emails are sometimes detected as spam, so we strongly recommend you add the following mail address to your whitelist: `gnnetchallenge2022@bnn.upc.edu`.

During the evaluation phase, the platform will show an anonymized ranking with the 5 best scores at the time. This may help assess in real time how good your results are compared to other teams. Each team will be considered for its best score, regardless of whether it is its last submission or not. Also, there will be a record of all the submissions made by the team and the scores obtained in each of them. If you have any doubts about the submissions registered by your team, you will be able to check this record on the home page of the BNN evaluation platform after logging in.

## Prepare your submission

**Our evaluation platform only supports ZIP files.** Otherwise, you will get an error and the submission will not be accepted. To prepare your submission, we provide a Python script [\[here\]](#) that generates the final ZIP files to be submitted. First, the script reads the samples from the user-generated training dataset and checks if it satisfies all the constraints (more information on the constraints [\[here\]](#)). Second, it checks if the model checkpoint selected by the user is valid. Finally, it generates the submission file (in ZIP format) compressing both files.

To run the script, you can simply execute it with the following command:

```
python generate_submission.py
```

*To avoid potential issues, please make sure you use the same virtual environment to execute the script as the one you used for the training dataset generation and the model's training.* The script first asks for the path of the training dataset. Then, it checks that all the constraints defined [\[here\]](#) are met. After this, the user is asked for the path to the folder containing the training checkpoints. The script will detect all the checkpoints found and will output a list with all of them. Since the training is fixed to 20 epochs, the script should return 20 checkpoints. Then, the user is asked to select one of them. Note that participants can select the best checkpoint generated during the training (not necessarily the last one).

The following lines show the output of the script when executing it. The text highlighted in **red** shows the input that the users need to define.

```
Indicate the path to the folder of the checkpoints used to train the
model: training
```

```
Checking the dataset...
==> Number of samples: 100
==> Dataset validated
```

```
Indicate the path to the folder of the checkpoints used to train the
```

model: `modelCheckpoints`

List of the checkpoints found:

```
['01-34.32', '02-24.33' ... '19-4.86', '20-5.16']
```

Select one of the checkpoints. It is not required to be the last one:

`19-4.86`

==> Checkpoint validated

Select destination path where to generate the submission file, or leave empty to use the root instead: `/tmp`

Submission name: `test_submission`

==> ZIP submission file generated

Please, also consider the following:

- It is not compulsory to use the provided script to generate the ZIP submission files. However, it is **STRONGLY RECOMMENDED to use it** since the script checks that all the dataset constraints are met and the training checkpoints are valid. In any case, this is also checked in the BNN evaluation platform. If you prefer to generate the ZIP file manually, it should have the following structure:

```
test_submission.zip
```

```
  |__ model
```

```
    |__ 19-4.86.index
```

```
    |__ 19-4.86.data-0001
```

```
  |__ dataset
```

```
    |__ graphs
```

```
      |__ <graphs files>
```

```
    |__ routings
```

```
      |__ <routing files>
```

```
    |__ <results_datasets_x_x.tar.gz>
```

- In order to work properly, the script only accepts a simple filename, without the extension of the submission file (i.e., “test\_submission”, instead of “test\_submission.zip”)

## Rules and other evaluation details

Before you prepare your submission, please double-check the rules on the challenge website to ensure your solution comply with all of them (Section “Rules” - <https://bnn.upc.edu/challenge/gnnnet2022/#rules>). **Note that each team can submit a maximum of 5 solutions (i.e., submission files) per day and, in total, teams can make up to 20 submissions during the whole evaluation phase.** Also, solutions must be exclusively trained with samples of the generated training dataset. **It is not allowed to use additional data from other datasets like the validation dataset we provide.** We will check it after the evaluation phase, as we will reproduce the training and evaluation of top-5 solutions. In this context, please note that solutions must be sufficiently ready to replicate the training/evaluation on our servers. It is the responsibility of the participants to facilitate the replication of the experiments on the BNN premises.

After the evaluation phase (**Oct. 3rd - Oct. 17th**), we will publish a provisional ranking with all the teams that submitted a solution (Oct 18th). Then, the top-5 teams will be asked to send their code

and a report describing their solution, and how to reproduce the training by Oct 31st. After checking that the top solutions comply with all the rules, the winners (top 3) will be officially announced (Nov. 2022) and they will be considered for the Grand Challenge Finale of the ITU AI/ML in 5G challenge (<https://aiforgood.itu.int/about-ai-for-good/aiml-in-5g-challenge>).

**Good luck! And enjoy the challenge!**