Challenge Title:

**Increasing the Amount of Fine-Scale Temperature Details from Weather Model Forecasts**

The field of meteorology constantly strives to achieve better weather forecasts by increasing the level of detail it can predict using sophisticated physics algorithms and supercomputers. Unfortunately, even with large supercomputers, there is an upper limit to the amount of physics-based models that can be computed in a timely manner. To improve on those limitations, meteorologists often use statistical techniques. We now seek to leverage more powerful AI techniques in order to achieve even better improvements in the forecasts.

This challenge is to increase the resolution (the level of detail)of 2D surface temperature forecasts obtained from Environment and Climate Change Canada (ECCC) ’s weather forecast model, using as labelled images 2D temperature analysis at higher resolution. The scale factor between the model and the higher resolution analysis is 4 (from 10 km to 2.5 km). These weather forecast gridded fields are just like images and we believe that Computer Vision algorithms would likely be excellent approaches to use.

Evaluation criteria

Mandatory:

Increased-resolution images must accurately represent reality, i.e., must demonstrate a realistic enhancement over the original low-resolution temperature forecasts.

Numerous and relevant 2D low-resolution weather forecast fields are provided as predictors in the training set. In addition to temperature, these include fields like cloud coverage, wind, humidity, topography, etc. are also included in the training set files.

We also provide thousands of images of gridded temperature analysis fields as target labels to train on, that correspond to the same dates of the training fields. Participants are to try to increase the resolution of the forecast images to look as much as possible like these higher resolution temperature analysis images. Some of the reference temperature grids, for January and July 2018, are in separate files since they are to be used to test the participant’s algorithms (models).

The data files contain two years' worth of forecast data and temperature analysis fields for every 3 hours. The participants can use all or a subset of this data for training their model, for every 3-hour period. However, the data for half of January 2018 and half of July 2018 are in two separate, test files that must be used by the participants only to calculate the final score of their model. They must not use this data in their training.

A predefined verification score is explained and provided as a script in two accompanying files. Participants are to calculate a score separately for each of the dates and times in the test files and then average all the scores together into one. Solutions (i.e., methodologies that can be reproduced) will be ranked using this score and evaluated.

Results to be provided by the Solvers:

* A detailed description of the methodology employed to solve the problem

A description of which data or subset of data was used for the training of the final model

All the scripts and source code used; or if source code refers to a software package or language, the versions used.

The code should be clear and with enough comments to be easily understandable by the judges.

The final model saved at the end of the training, as well as instructions to load and run this model.

A plot of the score evolution through training (training set and validation set)

The scores for each date and time of the test set and the average of these scores that will be used as the grade achieved by each participant. The lower the score (which is an equivalent rms error) the better.

And anything else we might need to reproduce the answers of the participants.