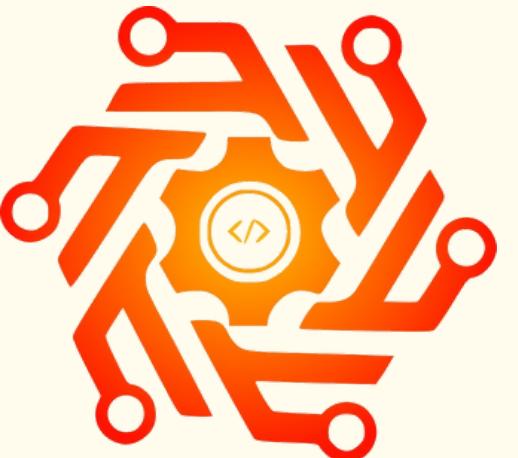
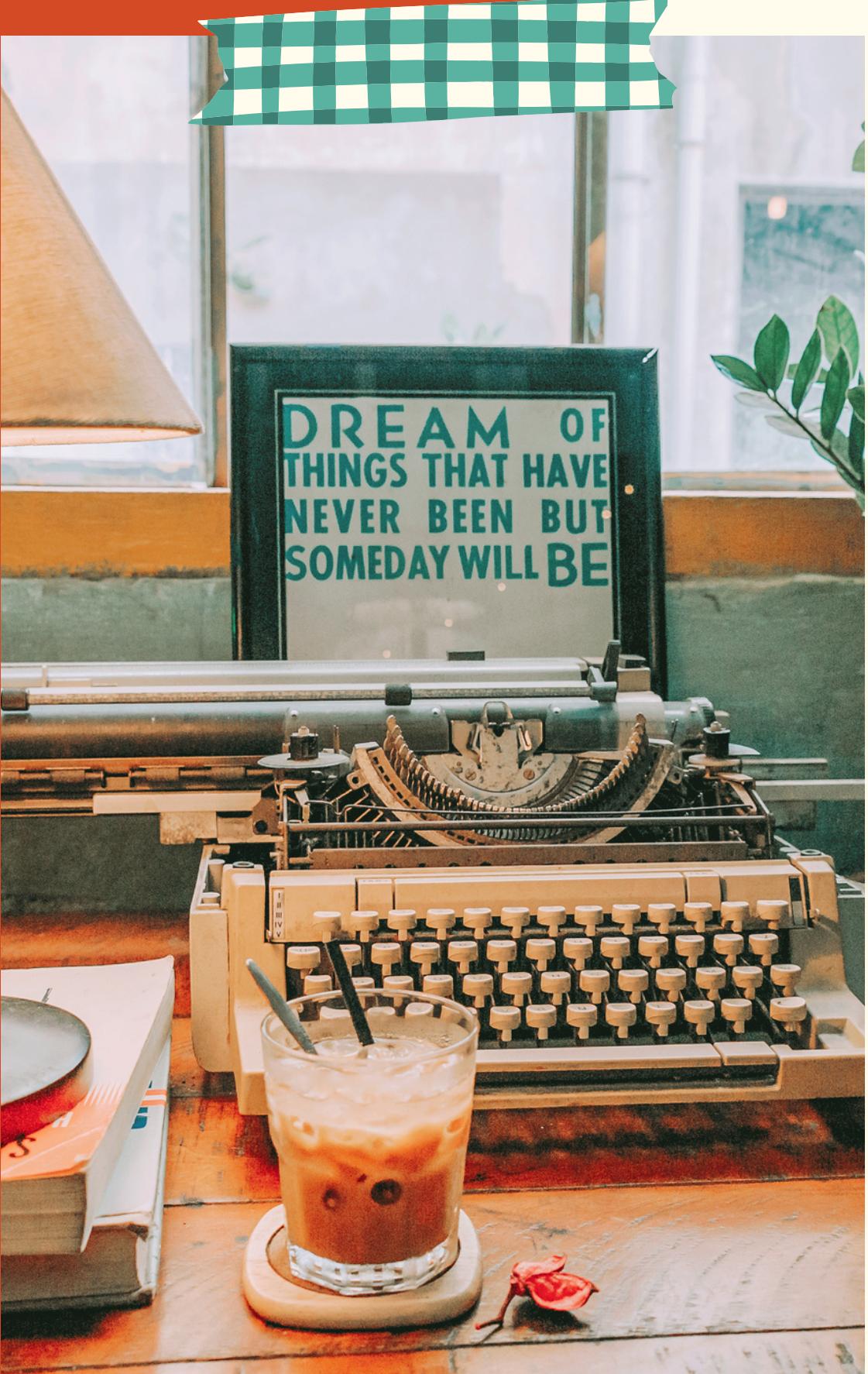


Cosmoscope: Beyond the Horizon Martian Atmos





Problem Statement

SHORT
BRIEF

- The Sample Analysis at Mars (SAM) instrument is a key part of NASA's Curiosity rover mission to explore the red planet. SAM's main goal is to detect and analyze organic molecules that contain carbon, such as methane, which are essential for life as we know it.
- SAM also studies how these molecules are produced and destroyed by various processes in the Martian environment, such as radiation, oxidation, and chemical reactions. By doing so, SAM helps us understand the potential habitability and history of Mars.

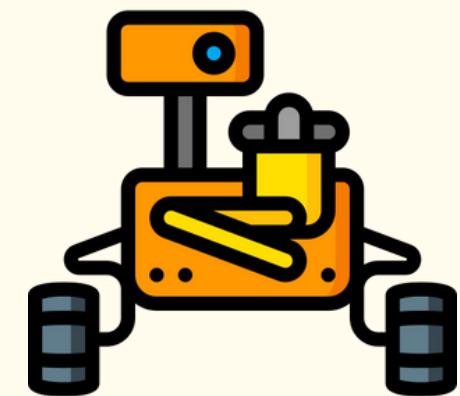




Project Objective

TASK

- Your goal is to discover the existence of specific chemical component families in geological material samples using data from Mars exploration missions and constructing machine learning models.
- These families are largely made up of organic chemicals that are important for understanding Mars' historical habitability.



Data Briefing

Each observational unit in the dataset is a physical sample whose features are provided as individual CSV files.

There are *three* dimensions given in long format:

- ◆ **time** - Time in minutes since start of data collection.
- ◆ **mass** – Mass-to-charge ratio (m/z) of ion being measured.
- ◆ **intensity** – Rate of ions detected, per second. Typically, all intensity values are compared in a relative way within one sample's analysis run.

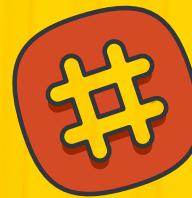
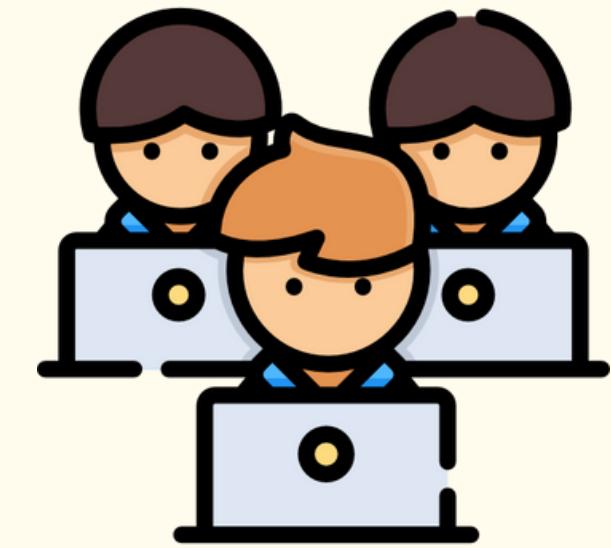
The data required for the project can be found in the drive linked [here](#).

Final Goal

- We expect you to primarily provide us with a csv file with predicted labels for the val_features with each row corresponding to each gas sample composition.
- Other visualizations are also highly encouraged.

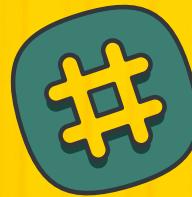


Evaluation And Timeline



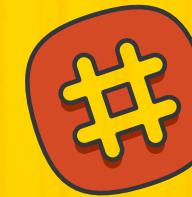
Evaluation Criteria

Your model will be evaluated on test data using the multilabel aggregated log loss metric. There will also be weightage towards data processing, and feature engineering.



Time limit

You will be given 3-4 weeks (tentatively) from the start date for the competition.



Team size

Teams can participate in groups of upto 6 members.



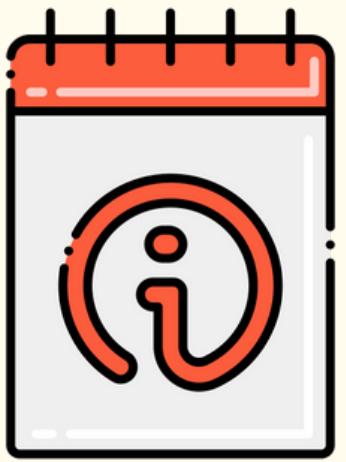
Submission Guidelines

Report/Documentation



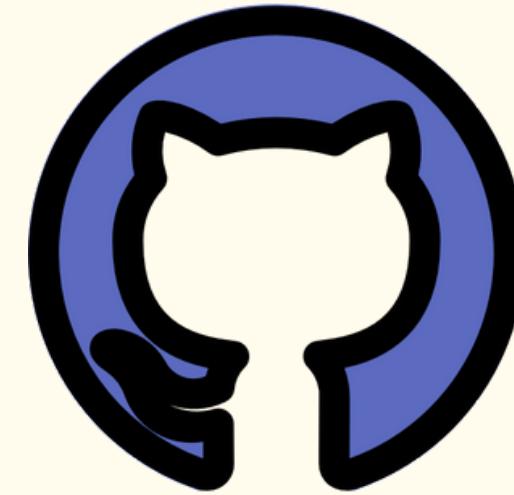
The teams must create a concise report that includes the workings and outcomes (model performance) as well as their thought process throughout the project.

ReadMe



All teams must create a ReadMe file which will have all the necessary details related to getting the project working

Submission



The complete project must be submitted as a GitHub repository, which will include all the codes(preferably in python notebooks), report, readme file or any other required files.



Thank You! for participating!

Wishing everyone all the best!



For any further queries:

Mail us at : space.ds.club@iitdh.ac.in

