Forecasting Martian Weather using Machine Learning

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**Project highlights:**

- Improved understanding of the OU’s Global Climate Model and sources of predictability in the Martian atmosphere
- Real-time prediction of surface weather conditions on Mars will engender significant advances in the planning of entry, descent, and landing operations.
- A multi-disciplinary project unifying techniques from software engineering, machine learning, and Mars science

**Project description:**

Mars Global Climate Models (GCMs) [1] provide researchers with realistic and reliable models of the Martian atmosphere. Yet, existing modelling techniques are still inefficient for predicting regional/global dust events on Mars, which is one of the biggest topics in Mars science today [2]. Machine Learning in general, and Deep Learning (DL) in particular, are increasingly used in climate predictions [4], and this PhD project will investigate DL solutions for climate prediction. It will leverage the OU OpenMars data to build DL solutions to forecast Mars weather, focusing on dust storms. Our aim is to develop the capability to predict global-scale dust storms on Mars, a capability that is critical to the human exploration of Mars.

The project will be supervised by a multi-disciplinary team of researchers with expertise in software engineering and machine learning as well as expertise in modelling the Martian atmosphere.

**Skills:**

For students with background in physics

- Good understanding of climate modelling
- Good oral and verbal communication skills
• (Desirable) Strong software development skills in languages such as Python or Java
• (Desirable) Knowledge of machine learning techniques

For students with background in computer science

• Strong software development skills in languages such as Python or Java
• Good oral and verbal communication skills
• Knowledge of machine learning techniques
• Interest in physics and Mars exploration

References:

