Science (S1-3)
Using Artificial Intelligence (AI) in Scientific Inquiry

Sample

Forecasting the Strength of Solar Radiation on Mars

(Teacher version)

EDB
2025

Reading Task P

Background

Mars rovers rely on solar panels to convert solar energy into electrical energy. This allows them to operate continuously. However, dust storms frequently occur on Mars, which can block sunlight and prevent the rover from charging. During a dust storm, keeping the solar panels open may risk damage. Your task is to find a method to predict when it is most suitable to open the solar panels to collect energy and when to close them to avoid damage.

Dust storm on Mars

Mars Rover

Scientific Models

Scientific models are representations, used to explain how nature works. Scientists conduct scientific inquiries, using the data obtained to construct, revise, and evaluate scientific models. These models help explore and understand scientific phenomena. Scientific models can be expressed in various forms, including diagrams (such as particle models and food webs), equations, and computer models.

Using Artificial Intelligence (AI)

Before we begin, let's understand artificial intelligence. Artificial intelligence (AI) is like a very smart computer program that can use scientific models and learn from data to make scientific predictions. AI is widely used for applications such as weather forecasting, where it can analyse vast amounts of data from satellites, sensors, and past data to predict temperature, rainfall, and extreme weather events. It can also be applied in agriculture activities, disaster management to track hurricanes and floods.

The Mission

In this activity, you will look into an AI predictive model to estimate when solar radiation intensity is high or low. You will consider using different data (such as Martian weather data, including temperature and humidity) to train and revise your predictive model, making its forecasts more accurate.

Pattern seeking Task A

1. A student said that temperature is a variable that can be used to predict whether solar radiation on Mars will be high or low. The data below show some sample environmental data collected on Mars. Rearrange the data from high to low and complete the table on the right.

Temperature （°C）	Radiation (High/Low)
-42	Low
-36	High
30	High
105	High
-111	Low
9	High
-8	Low
-60	High
4	Low
0	Low
-143	High
-144	Low
57	High
-2	High
70	High
88	High

Temperature （°C）	Radiation (High/Low)
105	High
88	High
70	High
57	High
30	High
9	High
4	Low
0	Low
-2	High
-8	Low
-36	High
-42	Low
-60	High
-111	Low
-143	High
-144	Low

2. According to the table, describe the relationship between the intensity of solar radiation at different temperatures.

Note: Teachers can guide students look for patterns according to the data in the table and discuss, e.g. at temperatures equal or above 9°C, solar radiation is high. However, when the temperature is lower than 9°C, the solar radiation may be low or high. (Other reasonable answers accepted)

Model Building Task A

1. **Building** a predictive model

Instruction:

1. Use an A.I. machine learning platform, e.g. https://machinelearningforkids.co.uk/.
2. Add a new project.
3. Define the variable as "temperature".
4. Input the training data (scan the QR code below to obtain the Excel files).

Instructional Video:

Data for building predictive model:

Note: Teachers may ask students to use screenshots, or other means, to show their progress of building predictive model. Teachers may also remind students that not all the available data are used for training the predictive model; some remaining data could be used to test the model built. If the data is uploaded by excel files (.csv), the 'Value' should be entered as small letter (lowercase) to match the file e.g. 'temperature'.

2. **Testing** the predictive model

Use the predictive model you have built to make predictions based on the following information:

temperature (°C)	Measured Solar Radiation (Low: L; High: H)	Predicted Solar Radiation (Low: L; High: H)	Prediction correct? (✓/×)
-42	L		
-19	L		
-14	L		
30	H		
-23	H		
-31	L		
6	H		
11	H		
35	H		
4	L		

3. **Evaluating** the predictive model

Calculate the percentage (%) of correct predictions using the following formula:

(number of matched test results / total number of test results) x 100%

=_____

Investigative Task C

Extension

By using other variables to build the predictive model, would the percentage (%) of correct predictions be increased? How about using multiple sets of variables or a larger set of data?

1. Use the available data and work with your classmates to build, test and evaluate at least two additional models using other variables (e.g., humidity, temperature, or both). Compare the performance of these models and select the best one for predicting solar radiation on Mars.

Name of the predictive model	Model _____
The variable(s) used for building the predictive model	For example: Humidity and solar radiation
The total number of data points used for training the predictive model	
The total number of data points remaining for testing the predictive model	
The percentage (%) of correct predictions $= \frac{\text{number of matched test results}}{\text{total number of test results}} \times 100\%$ (The results are subject to the student's modifications to the model)	The percentage (%) of correct predictions = _____/ _____ × 100% = _____

Name of the predictive model	Model ____
The variable(s) used for building the predictive model	For example: Temperature, Humidity and solar radiation
The total number of data points used for training the predictive model	
The total number of data points remaining for testing the predictive model	
The percentage (%) of correct predictions $= \frac{\text{number of matched test results}}{\text{total number of test results}} \times 00\ (\ \%$ (The results are subject to the student's modifications to the model)	The percentage (%) of correct predictions = _____/ _____ × 100 % = _____

Note: Teachers can emphasise the importance of managing control variables. For example, the number of training data points, testing data points and the variables used should not be changed at the same time when comparing different models.

Extension

2. Evaluation

Compare and select the best predictive model:

Claim	I recommend using: Model _____ to predict the strength of solar radiation on Mars.
Evidence	
Reasoning	

Discussion Task I

1. i) Write down two questions that you would like to further explore based on the project you have completed.

Question 1:
Question 2:

Note: Teachers may use online platform to collect the questions from students, and use AI to find out the most popular three questions among the class for further discussions.

The discussion should focus on facilitating students to think about –

(1) whether the questions selected are investigable using scientific methods;

(2) what information is needed to further investigate the project.

ii) Choose one of the most popular three questions in your class and design a plan with your classmates to further investigate on this question.

Other optional questions (AI aspects)

2. Which of the following statements do you think describes a characteristic of artificial intelligence (AI) predictive models?

☐	AI is a technology that can train computers to perform tasks without the need for explicit step-by-step instructions.
☐	AI prediction is capable of foreseeing the future.
☐	AI means we no longer need to solve problems because AI will solve them for us.
☐	AI models can only run on supercomputers.

Self-assessment

Check list	
I am able to organise the data in a logical manner.	☐
I am able to construct a predictive model based on the data provided.	☐
I am able to calculate the percentage (%) of correct prediction of the AI predictive model.	☐
I am able to make evaluation and choose the best predictive model for the task.	☐
I am aware of the benefits and limitations of using AI predictive models and how can the model be improved.	☐