Understanding Artificial Intelligence: Basics and Everyday Uses

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Project Title: Predicting Landslides Using AI

Introduction

Maya, a sixth-grade student from a government school in Rudraprayag, presented this project, which focuses on creating an early warning system for landslides. By using data such as rainfall patterns, soil moisture, and slope steepness, the model aims to predict landslide risks and provide timely alerts to help keep people safe. This project offers an innovative approach to managing natural disasters in mountainous regions, where landslides are a frequent threat, especially during the monsoon season. It has been recognised as a valuable initiative for enhancing community safety.

Problem

In mountainous regions, frequent heavy rains during the monsoon season lead to landslides, causing road blockages, property damage, and endangering lives. The lack of an early warning system leaves communities unprepared, increasing the risk of injury and loss.

Solution

This project addresses the need for a reliable method to predict landslides in advance, allowing villagers to take necessary precautions and stay safe.

Prototype Model Description

The prototype model for this landslide warning project is designed to predict landslide risks by analysing environmental factors in real time. The model uses a combination of sensors and data processing techniques to monitor rainfall, soil moisture, and slope steepness in landslide-prone areas.

- **Rainfall Monitoring System**: A rain gauge measures the amount of rainfall in real-time, recording data that indicates potential landslide risk when levels are high.
- **Soil Moisture Sensors**: These sensors track the moisture content in the soil. High moisture levels combined with significant rainfall can signal an increased likelihood of landslides.
- **Slope Steepness Analysis**: Using basic data on slope angles, the model assesses the risk level, as steeper slopes are more prone to landslides when combined with heavy rain and wet soil.
- **Alert System**: Based on the combined data from rainfall, soil moisture, and slope steepness, the model classifies risk levels as low, medium, or high. In high-risk situations, the model sends out an alert to inform the community to take precautions or avoid the area.

This prototype is a practical solution that provides an early warning, enabling the community to take preventive measures and enhancing safety during the monsoon season.

Let us see how Maya learnt about AI and worked on a project related to her real-life situations with the guidance of Mrs. Joshi.

Steps for working on the Project

Step 1: Understanding AI Basics

1. Maya learnt about AI from her teacher: AI is like a smart computer that can study patterns in data and make predictions. For example, it can learn to predict landslides by looking at weather and soil information.

   > What is Artificial Intelligence?
   >
   > AI, or **Artificial Intelligence**, is when we teach computers to think and make decisions like humans. Think of AI as a "smart helper" that learns from information, notices patterns, and makes guesses about what might happen next.
   > **Example:** Imagine you have a friend who's really good at guessing what you want to watch based on what you've liked before. AI works in a similar way, but with data. It can guess things like when a landslide might happen if it has enough information about rain, soil, and slopes.

2. She set the project goals: Her goal was to build an AI model that helps predict landslides so she can alert people and keep them safe.

   > **How Does AI Learn? (Machine Learning)**
   > AI learns by looking at lots of examples, just like you learn by practicing math problems or spelling words. This process is called **Machine Learning**. Here's how it

works in a simple way:

Getting Information: Just like you need facts to answer questions, AI needs data. For Maya's project, AI needs information about rainfall, soil moisture, and slopes.

Finding Patterns: AI looks for patterns in the data. It might notice that landslides often happen when it rains a lot and the soil is very wet.

Making Predictions: Once it understands the patterns, AI can make guesses or predictions. For Maya's project, it predicts the risk level of landslides.

Example Activity: Think of AI as a detective. If you give it clues (data), it will look for patterns to solve the mystery (like predicting landslides).

Step 2: Gathering Data on Landslide Causes

1. **What Causes Landslides?**

   Landslides often happen because of

   ● Heavy Rainfall (Lots of rain make the ground slippery).
   ● Wet Soil (if the soil is already very wet, it may not hold together).
   ● Steep Slopes (steeper hills are more likely to slide).

2. **Collection of data for each factor:**
   ● Rainfall: Maya measured rainfall daily using a rain gauge or ask an adult for this data.
   ● Soil Moisture: She checked how wet the soil is using a soil moisture meter or observed if it's very soggy.

- Slope Steepness: And she also noted the slope steepness in different parts of your area (ask for help if needed).

3. **Recording the Observations:** Maya made a table in a notebook with columns for date, rainfall, soil moisture, and slope steepness.

Step 3: Organizing the Data

1. **Filling the Table Daily:** She added data to her table every day and tried to note down if any landslides happen in her area or nearby. A sample of the table is given below:

Date	Rainfall	Soil Moisture	Slope Steepness	Landslide Risk (Low, Medium, High)
June 1	High	High	Steep	High
June 2	Low	Low	Moderate	Low

2. **Look for Patterns**: After a week or two, she checked if landslides happen when there's heavy rain and high soil moisture.

Step 4: **Create a Flow Chart for Your AI Model-** Maya created a simple flow chart for the project, like this:

- Start
- Check Rainfall
- If rainfall is "High," check Soil Moisture
- If soil moisture is "High," check Slope Steepness

- If slope is "Steep," the AI should issue a "High Risk" alert
- If slope is "Moderate," issue a "Medium Risk" alert
- If soil moisture is "Low," issue a "Low Risk" alert
- If rainfall is "Low," issue a "Low Risk" alert.

Draw It Out: She drew this flow chart on a poster to make it easy to understand. She showed each decision clearly with arrows and labels.
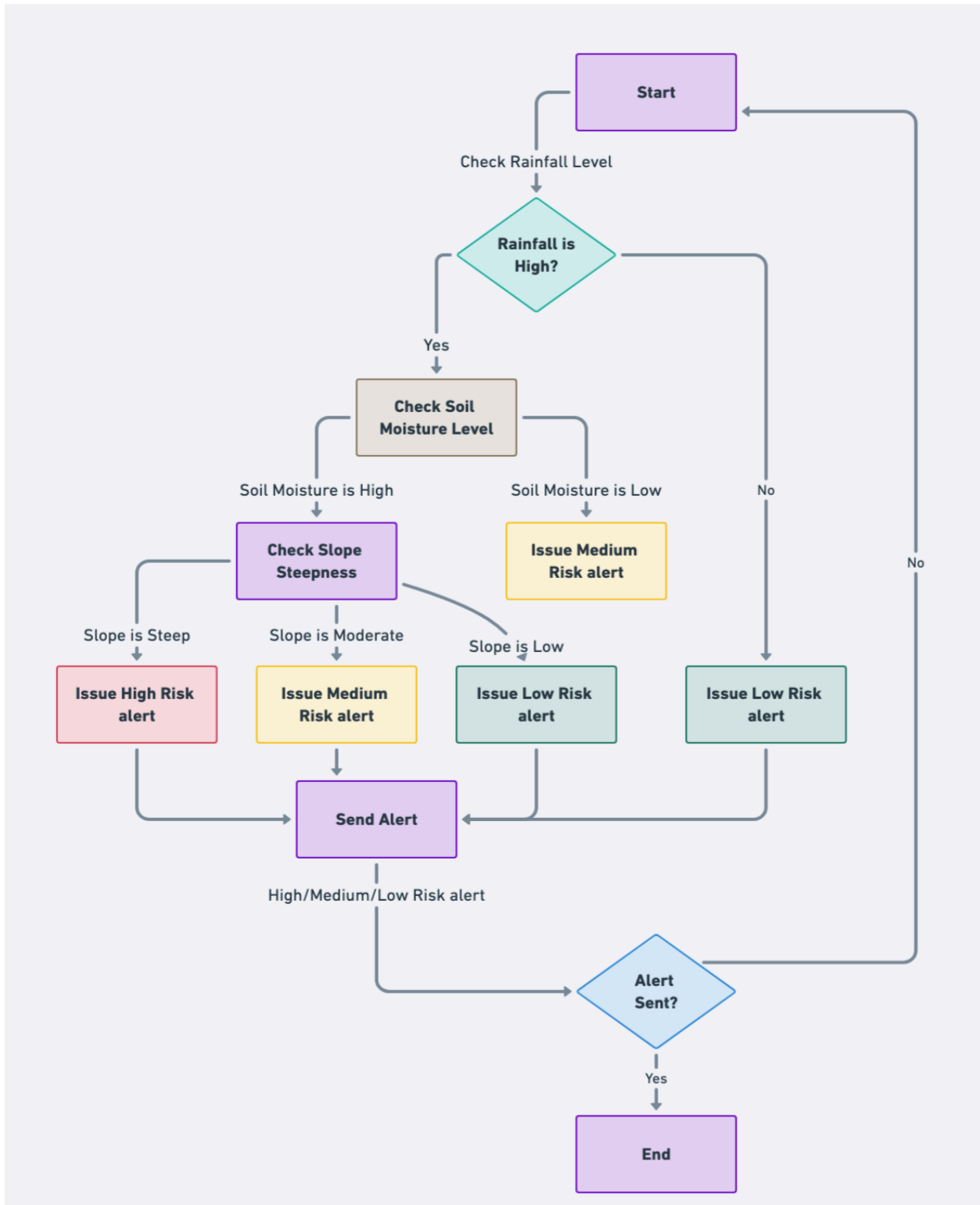
Flow chart for the Landslide Prediction Model

Fig. Flow chart for the Landslide Prediction Model

Step 5: Test Your Model

1. Try Out Your Model: Maya used the flow chart and data to see if it accurately predicts landslides. For example:
● On a rainy day with wet soil on a steep slope, does the model predict "High Risk"?
2. Make Adjustments: If you notice the predictions aren't quite right, adjust your flow chart to improve it.

Step 6: Set Up an Alert System

A. Create Colour-Coded Alerts: Maya used colours to show different levels of risk. For example:
● Green: Low risk
● Yellow: Medium risk
● Red: High risk
B. Share with Your Community: Maya showed her family and classmates how the colour-coded alerts work, so they understand what each colour means.

Step 7: Present Your Project

● Summarise Your Project: Maya wrote a short explanation of what her AI model does, how she gathered data, and how it predicts landslides.
● Create a poster or presentation: She used her flow chart, data table, and colour-coded alerts to explain the project to her classmates.
● Explain How AI Helps: She also talked about how AI can help solve real-life problems and keep people safe.

Testing the AI Model

When the monsoon rains began, Maya's model was ready. On a rainy day, the AI predicted a medium risk for landslides near her village. Mrs. Joshi and Maya informed the village head, who passed the warning along to everyone.

The villagers took extra care, and sure enough, a landslide happened – but no one was hurt because they were prepared. Maya's AI project had given them an early alert!

The Impact of Maya's Project

Maya's project received praise from the community and even from officials in her town. People saw how AI could help keep everyone safe by giving early warnings during the monsoon season. Inspired by her success, Maya started thinking about ways to make her AI model even better for the next year.

The village elders were proud of Maya's work, and her classmates admired how she used technology to help her community. Her project showed everyone that even a sixth-grader could make a big difference using AI.

Conclusion

Maya's story teaches us that AI isn't only for big cities or tech companies. It can solve important problems anywhere, even in small hill villages. By using AI, Maya showed her community how technology could help protect them from landslides and save lives. Her project inspired others to learn more about how AI could keep people safe and help build a better future for everyone.

Video link - https://www.youtube.com/watch?v=n0S30MmBbuY