Managing fire: Increasing Community-based Fire Management Opportunities

Momento Decisivo Team:
- Wendy Chaparro Meneses
- Ferney Zamudio Montero
- Cristopher Ramirez Ramirez
- Julian Martinez Parra
- Sergio Rodriguez Rubio
- Sebastián Ariza Parra

Problem statement

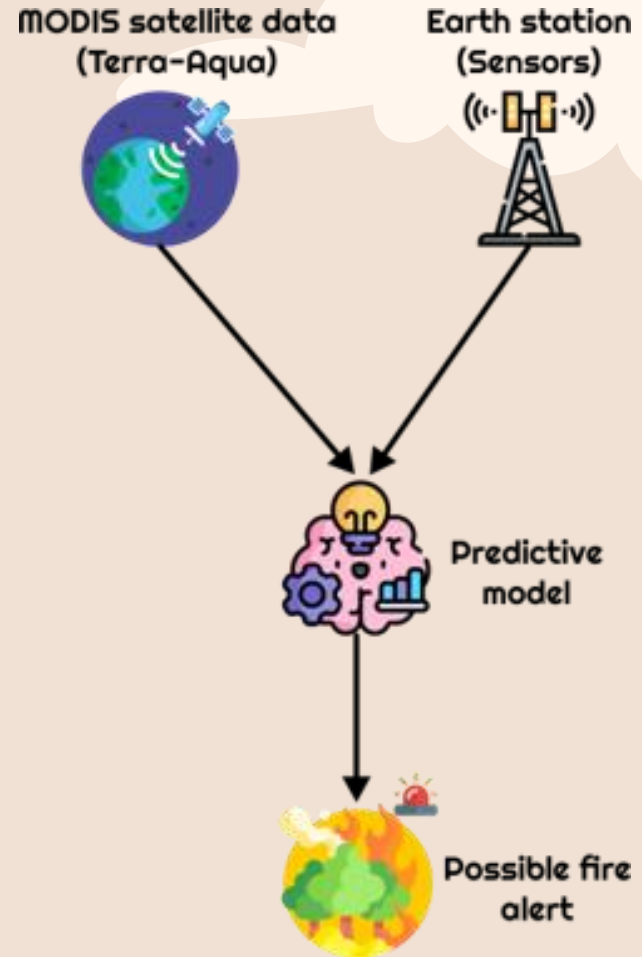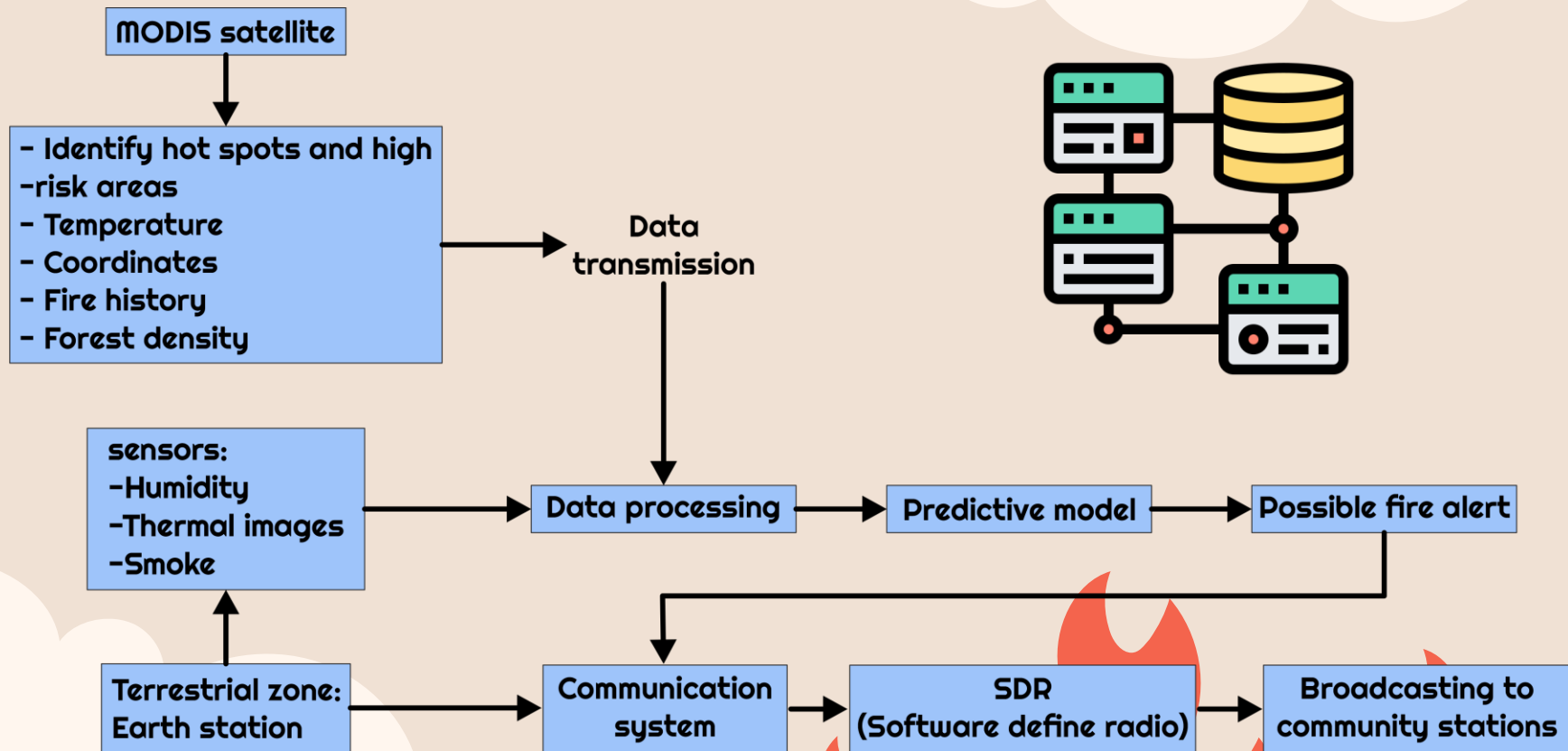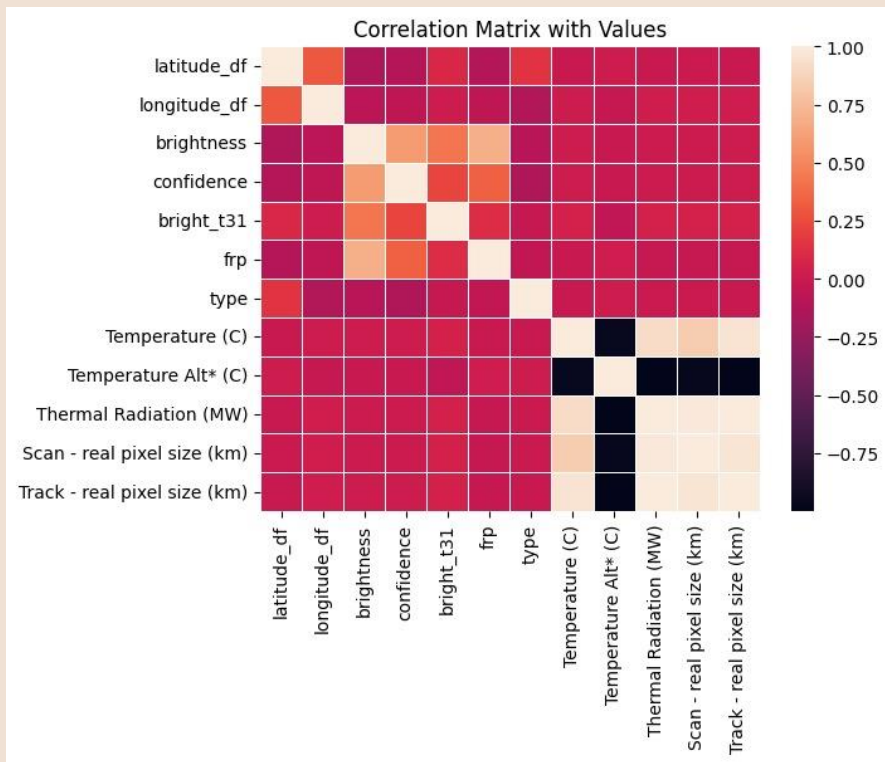|	
THREATS Wildfires cause lasting economic and social damage by affecting infrastructure, property and local employment.	**STRENGTHS** community's intention to care for the environment, fauna and natural resources
WEAKNESSES Limited access to technology and data	**OPPORTUNITIES** learning and adapting to new technologies

03 Objectives

Create a forest fire warning and monitoring system based on satellite data to improve information accessible to local communities.

- Analyze temperature and soil moisture data to find correlations with the probability of forest fires.

- Use a neural network with real-time data from MODIS satellites (Aqua and Terra) and VIIRS to predict and prevent forest fires.

- Implement a neural network with the collected data to evaluate possible fire alerts.

MODIS satellite data (Terra-Aqua)

Earth station (Sensors)

Predictive model

Possible fire alert

Operating diagram

MODIS satellite

- Identify hot spots and high
-risk areas
- Temperature
- Coordinates
- Fire history
- Forest density

Data transmission

sensors:
-Humidity
-Thermal images
-Smoke

Data processing

Predictive model

Possible fire alert

Terrestrial zone:
Earth station

Communication system

SDR
(Software define radio)

Broadcasting to community stations

# HOW DOES IT WORK?

Correlation Matrix with Values

The correlation matrix of satellite data reveals the connection between them, essential to identify when the satellite can detect fires.

We use these findings to develop a neural network that predicts the probability of forest fires based on the most highly correlated variables relevant to the study. This will help us make decisions based on real-time data to prevent fires or act more quickly.

EXPECTED IMPACTS

- Encourage fire management efforts led by fire-affected communities.
- Raising awareness of the importance of counteracting forest fires
- Empower communities by improving access to information.
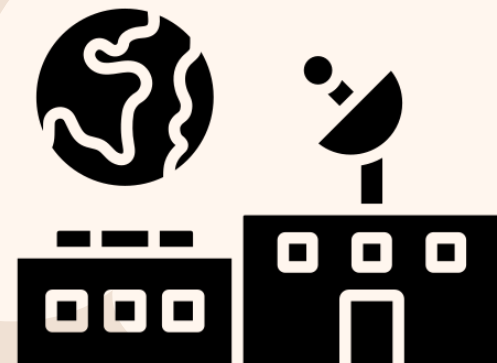
FUTURE WORK

- Implementing AI to facilitate improved accuracy of satellite imagery
- Develop a user interface that is intuitively accessible to the user.
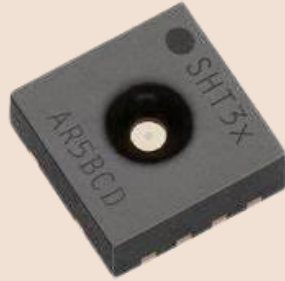- Identify the areas with the highest probability of fires to place ground stations.

Sensors

Communication

smoke sensor

Humidity and temperature sensor

SDR

Yagi Antenna

Thermal imaging sensor

Benefits

- By monitoring different variables, data is confirmed, and incorrect alerts are avoided.

- facilitates communication using SDR as a rapid response to possible fires.