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Fire risk index map based on satellite imagery and weather data

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ABSTRACT

This disclosure describes techniques to determine and depict a fire risk index. Per techniques of this disclosure, historical satellite imagery data is combined with weather data to determine a fire risk index. Satellite imagery data is obtained and analyzed for regions that are historically prone to fires. The vegetation map is analyzed for vegetation data that include foliage density and the presence of live green vegetation. Weather pattern data such as wind data, rainfall data, ambient temperature, humidity, etc. are obtained. The weather data and vegetation data are used to determine a fire risk index, e.g., using machine learning techniques. The fire risk index can assist public agencies to identify areas of high risk for fires. The fire risk index can be updated periodically.

KEYWORDS

- Fire risk
- Risk index
- Remote sensing
- Fuel moisture content
- Geographic information systems (GIS)
- Forest fire
- Bushfire
- Satellite imagery
- Normalized difference vegetation index (NDVI)

BACKGROUND

Fires such as bushfires and forest fires pose to risk to public and private lands throughout the world and can cause considerable damage. The spread of a fire, once started, can be difficult to control, so early containment is critical. Identifying areas with a high fire risk can assist public agencies in planning their strategy and resources.

DESCRIPTION

This disclosure describes techniques to determine and depict a fire risk index. Per techniques of this disclosure, historical satellite imagery data is combined with weather data to determine a fire risk index. The fire risk index can be depicted as an overlay on a map.

Fig.1: Fire risk is computed and depicted as an overlay on a map

Fig. 1 illustrates an example portion of a map that depicts areas with different degrees of fire risk. In this illustrative example, areas of low fire risk, moderate fire risk, high fire risk, and very high fire risk are identified and delineated on a map. The areas can also be depicted as a color indexed map where the fire risk index data are represented as color indices with discrete ranges.

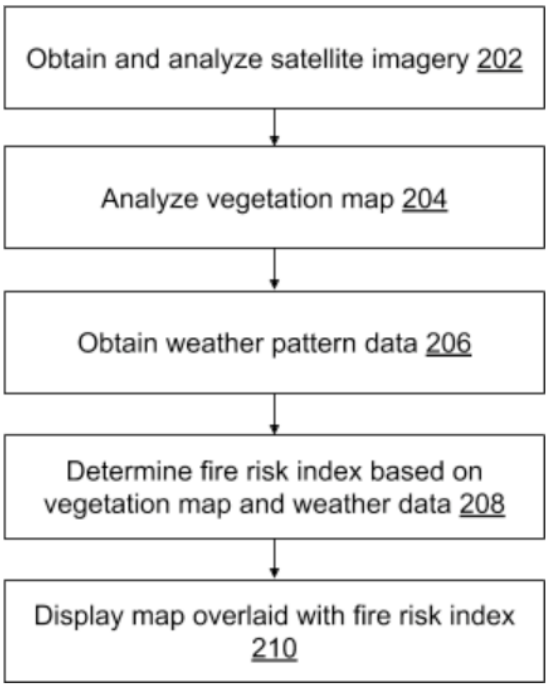

Fig. 2: Determination of fire index data from satellite and weather data

Fig. 2 illustrates an example determination of fire risk index data. Satellite imagery data such as Landsat data is obtained and analyzed (202). Historical and current data is analyzed, particularly for regions that are historically prone to fires.

The vegetation map, e.g., a normalized difference vegetation index, is analyzed (204) for vegetation data that include foliage density which are indicative of an extent and presence of live green vegetation. The vegetation data also includes the density and moisture content in the vegetation. Weather pattern data such as wind data (direction and intensity), rainfall data, ambient temperature, humidity, etc. are obtained (206). The weather data and vegetation data are used in the determination of fire risk index.

Machine learning techniques can be used to determine the fire risk index based on historical weather, vegetation, and fire event data. Any suitable machine learning technique can be used.

The fire risk index as determined using the techniques described herein, in combination with other assessments of fire risk, can assist public agencies to identify areas of high risk for fires. Preventive measures, such as firebreaks and water defenses can then be put in place, based on the identified areas of high risk. The fire risk index can be updated periodically, e.g., annually before the fire season..

CONCLUSION

This disclosure describes techniques to determine and depict a fire risk index. Per techniques of this disclosure, historical satellite imagery data is combined with weather data to determine a fire risk index. Satellite imagery data is obtained and analyzed for regions that are historically prone to fires. The vegetation map is analyzed for vegetation data that include foliage density and the presence of live green vegetation. Weather pattern data such as wind data, rainfall data, ambient temperature, humidity, etc. are obtained. The weather data and vegetation data are used to determine a fire risk index, e.g., using machine learning techniques. The fire risk index can assist public agencies to identify areas of high risk for fires. The fire risk index can be updated periodically.

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