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## Machine learning approach for multi-perspective volcanic eruption recognition using thermal infrared images

**Claudia Corradino**, Gaetana Ganci, Giuseppe Bilotta, Annalisa Cappello, and Ciro Del Negro  
Istituto Nazionale di Geofisica e Vulcanologia, Sezione Catania, Catania, Italy (claudia.corradino@ingv.it)

Detect, locate and characterize eruptions in real-time is fundamental to monitor volcanic activity. Here we present an automatic system able to discover and identify the main types of eruptive activities by exploiting infrared images acquired by the thermal cameras installed around Mount Etna volcano. The system, which employs the machine learning approach, is based on a decision tree tool and a bag of words-based classifier. The decision tree provides information on the visibility level of the monitored area, while the bag of words-based classifiers detects the onset of the eruptive activity and recognize the eruption type among either explosion and/or lava flow or plume. Thus, applied to each image of all thermal cameras over Etna in real-time, the proposed system provides two outputs, namely the visibility level and the recognized activity status. By merging the outcomes coming from each thermal camera, the monitored phenomena can be fully described from different perspectives getting deeper information in real-time and in an automatic way.