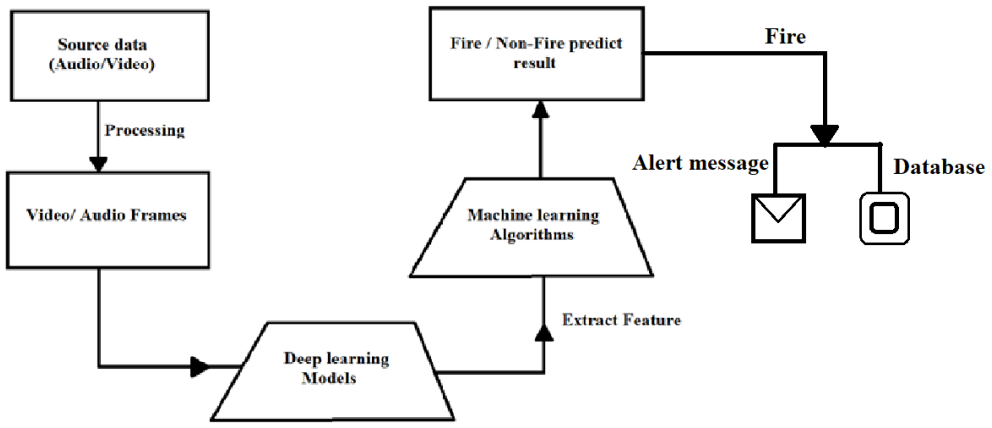
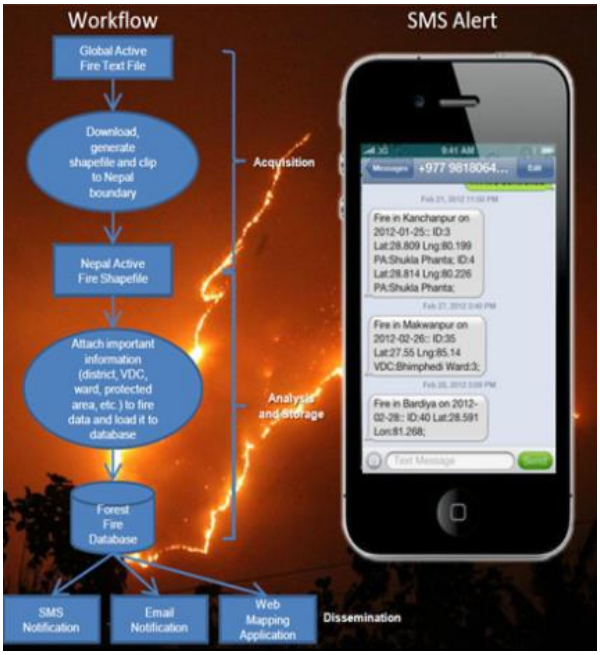
PROPOSED SOLUTION

EMERGING METHOD FOR EARLY DETECTION OF FOREST FIRES

PROBLEM STATEMENT (PROBLEM TO BE SOLVED)	Forest fires are a major environmental issue, creating economic and ecological damage while endangering human lives. There are typically about 100,000 wildfires in the United States every year. Over 9 million acres of land have been destroyed due to treacherous wildfires. It is difficult to predict and detect Forest Fire in a sparsely populated forest area and it is more difficult if the prediction is done using ground-based methods like Camera or Video-Based approach. Satellites can be an important source of data prior to and also during the Fire due to its reliability and efficiency. The various real-time forest fire detection and prediction approaches, with the goal of informing the local fire authorities.
IDEA / SOLUTION DESCRIPTION	
NOVELTY / UNIQUENESS	The application can be enhanced by training the model with a larger dataset consisting of fires at various stages and dimensions. With higher GPU memory, we could use two deep learning models for feature extraction, whose output feature vectors are concatenated and classified to offer more robustness. An R-CNN model can be used to implement fire localization along with classification. We can also expect better deep learning architectures to emerge in the future that offers better feature extraction. The application will also offer a considerably better performance when run on machines having better processing power compared to existing one of which it has been developed.
SOCIAL IMPACT / CUSTOMER SATISFACTION	Fire accidents have caused death and destruction all over the world, consuming countless lives and causing billions in damages. This implies that developing an accurate, early, affordable fire-detection system is imperative Therefore, we have proposed a fire detection model for videos/video frames using transfer learning for deep learning. The models make use of ResNet-50, InceptionV3 and Inception-ResNet-V2 models to extract the features and various ML algorithms such as SVM, Logistic Regression, Naive Bayes and Decision Tree on the extracted features to detect fire in video frames.

BUSINESS MODEL (FINANCIAL BENEFIT)	Early detection of fire-accidents can save innumerable lives along with saving properties from permanent infrastructure damage and the consequent financial losses. In order to achieve high accuracy and robustness in dense urban areas, detection through local surveillance is necessary and also effective. Thus, detecting fires through surveillance video stream is one of the most feasible, cost-effective solution suitable for replacement of existing systems without the need for large infrastructure installation or investment. The existing video-based machine learning models rely heavily on domain knowledge and feature engineering to achieve detection therefore, have to be updated to meet new threats.
SCALABILITY OF SOLUTION