Sensor-Fusion Smoke Detection Classification

A smoke detector is a device that senses smoke, typically as an indicator of fire. Smoke detectors are usually housed in plastic enclosures, typically shaped like a disk about 150 millimetres (6 in) in diameter and 25 millimetres (1 in) thick, but shape and size vary.

Smoke detectors save a lot of lives. For example, the number of fire victims fell by more than 48% in France from 1982 to 2012 and 56% in the UK from 1982 to 2013. These reductions can largely be linked to increased fire safety regulations and smoke detectors. In the U.S. 96% of all homes have smoke alarms and approximately 20% of homes with smoke alarms have non-operational smoke alarms. It is estimated that if every home had working smoke alarms, U.S. residential fire deaths could drop by 36%, with nearly 1100 lives saved per year. With an increasing number of smoke detectors, false alarms became a problem. The number of false fire alarms is increasing continuously, which is a severe issue for firefighters.

Your task is to devise a Machine Learning model that helps us detect smoke with the help of IOT data and trigger a fire alarm, thereby preventing any mishap.

Collection of training data is performed with the help of IOT devices since the goal is to develop a AI based smoke detector device.

The dataset features in detail:

* Air Temperature
* Air Humidity
* TVOC: Total Volatile Organic Compounds; measured in parts per billion (

[Source](https://en.wikipedia.org/wiki/Volatile_organic_compound)

)

* eCO2: co2 equivalent concentration; calculated from different values like TVCO
* Raw H2: raw molecular hydrogen; not compensated (Bias, temperature, etc.)
* Raw Ethanol: raw ethanol gas (

[Source](https://en.wikipedia.org/wiki/Ethanol)

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* Air Pressure
* PM 1.0 and PM 2.5: particulate matter size < 1.0 µm (PM1.0). 1.0 µm < 2.5 µm (PM2.5)
* Fire Alarm: ground truth is "1" if a fire is there
* CNT: Sample counter
* UTC: Timestamp UTC seconds
* NC0.5/NC1.0 and NC2.5: Number concentration of particulate matter. This differs from PM because NC gives the actual number of particles in the air. The raw NC is also classified by the particle size: < 0.5 µm (NC0.5); 0.5 µm < 1.0 µm (NC1.0); 1.0 µm < 2.5 µm (NC2.5);

The sample rate is 1Hz for all sensors. To keep track of the data, a UTC timestamp is added to every sensor reading.