Extracting Hidden Signals in Chemical Sensors using Deep Learning Based Anomaly Detection

이유한, 조수연[1], 이상원, 강호형, 김재훈[2], 최정훈, 류 진,
주희은, 정희태, 김지한†
한국과학기술원; [1]Massachusetts Institute of Technology;
[2]삼성SDS
(jihankim@kaist.ac.kr†)

Deep learning have shown remarkable performances to extract features automatically in various fields. Especially, auto-encoder have been applied to extract patterns of normal states which is used to classify the normal from the anomaly in anomaly detection. Gas sensing is a kind of anomaly detection in which anomalous gas is detected from normal baseline. Limit of detection (LOD) is used to determine what is normal or abnormal in chemical and biological sensors, but this is only based on amplitude. In this work, we apply deep learning-based anomaly detection to metal film-based gas sensing to enhance selectivity by monitoring not only amplitude also overall patterns of signals. With this approach, we show that deep neural network can find the hidden signal under LOD, which lead to enhanced sensing for H_2. Our approaches are end-to-end (no need for feature engineering) and easy-and-fast (need simple architecture and only few minutes for training), which can take a crucial role for next-generation chemical and biological sensing.