**Facial Emotion Detection Based on Hyperdimensional Computing**

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For several decades, people have been trying to create machines that are capable of classifying human emotions. This project aims to design a machine learning tool that closely models how the human brain works. We exploit brain-inspired HyperDimensional (HD) computing as an alternative paradigm that mimics important brain functionalities towards high-efficiency and noise-tolerant computation. HD computing is motivated by the observation that the human brain operates on high-dimensional data representations. In HDC, objects are thereby encoded with high-dimensional vectors, called hypervectors, which have thousands of elements. HD computing mimics important functionalities of the human memory model with vector operations, which are computationally tractable and mathematically rigorous in describing human cognition. There are various encoding modules for HD computing that map raw data into high-dimensional space. In this project, we utilized Level-ID and OnlineHD encodings to run HD computing on embedded devices with high energy efficiency, performance, and accuracy. WhileLevel-ID encoding uses encoder and associative memory, OnlineHD encoding employs a combination of single-pass training and retraining technology. Level-ID encoding can achieve fast computation and high accuracy for linear datasets. However, it indicated a much lower accuracy than other HD encoding methods for more complicated datasets. On the other hand, the OnlineHD encoding can ensure high accuracy for complicated datasets. However, because of the retraining model, it was much slower than other encodings. As a result of applying these encodings for emotion classification, OnlineHD encoding showed better accuracy while Level-ID encoding showed a relatively lower accuracy but fast computation.