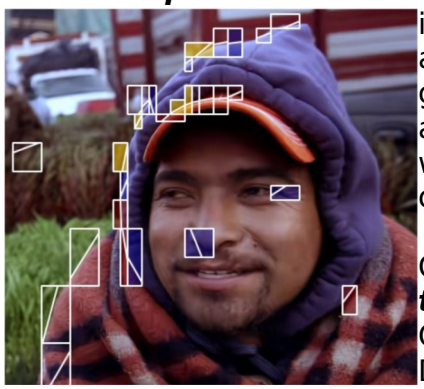
Data-driven dictionary design to achieve l_0 sparse representation of non-rectangular signal optimized for AOM codec

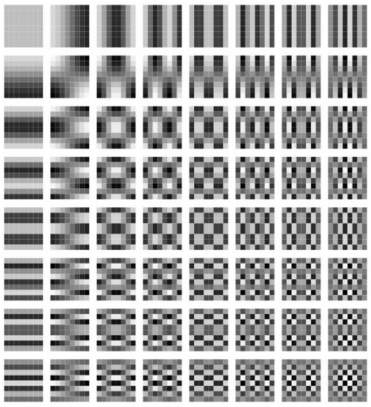
Priyanka Das
Research Scientist
priyanka.das@lfb.rwth-aachen.de

Background

Video compression is an important task given a significant portion of internet traffic is video. The main goal of video compression algorithms are to encode a video with highest possible quality for a given rate. Traditionally video coding tools have been applied on a ***block***-basis. There are some new tools to work on ***non-rectangular blocks*** to align more with object boundary.

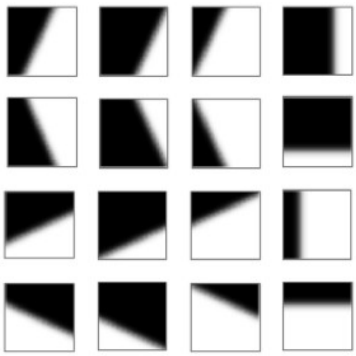


One important tool is ***transformation*** (Discrete Cosine Transformation or Discrete Sinusoid Trasnformation) which works on rectagular blocks.



2D DCT bases for 8x8 blocks

Dictionary learning is a classical ***machine learning*** technique to find a set of atoms called dictionary (***DCT*** bases shown is a special dictionary) to represent signal as sparsely as possible.



The main goal of this thesis is to find ***dictionaries for non-rectangular signals*** (the shapes are given on the left) to transform residual signal inside codec.

Requirements

- Understanding and interest in signal processing
- Background in video coding would be helpful
- Experience in Matlab or Python