Notes for week 5 part 2 (MPEG Editing)

MPEG video editing is done in the compressed domain for the following reasons: it’s faster, uses less storage, and it prevents a loss of video quality from re-encoding after decoding.

Given this input sequence:
I1 B2 B3 B4 P5 B6 B7 B8 I9 B10 B11 B12…

If B7-B11 are cut out of the sequence, B6’s macroblock will need to be fixed since it depends on I9 before the cut (see main lecture notes).

Originally, B6’s macroblock contained:

\[ MB_{B6} = \frac{MR_{P5} + MR_{I9}}{2} + e \]

The goal is to eliminate the dependency on I9. This means that we need to define \( MB_{B6} \) as:

\[ MB_{B6} = MR_{P5} + e' \]

Combining equations, we can see that \( e' \) is:

\[ e' = e + \frac{MR_{I9} - MR_{P5}}{2} \]

Realistically speaking, since we’re working in the compressed domain, what we have is \( DCT(e) \) //the DCT of the original error value//, and what we want is \( DCT(e') \). Thus, we can write the equations above as:

\[ DCT(e') = DCT(e + \frac{MR_{I9} - MR_{P5}}{2}) \]

By using the property \( DCT(A+B)=DCT(A)+DCT(B) \), we can rewrite the above equation as:

\[ DCT(e') = DCT(e) + \frac{1}{2} DCT(MR_{I9}) - \frac{1}{2} DCT(MR_{P5}) \]

So, to eliminate the dependency on \( MR_{I9} \), the \( \frac{1}{2} \) DCT (\( MR_{I9} \)) needs to be removed from the equation. Since the macroregion for \( MR_{I9} \) doesn’t necessarily fall on a 16x16 boundary, matrix operations on the macroblock containing \( MR_{I9} \) will need to be performed to obtain the value for \( MR_{I9} \). See the main lecture notes for more detail.