

From: Krishna Ratakonda <ratakond@us.ibm.com>
Sent: Tuesday, September 17, 2002 5:11 AM
To: Sandy (Alexander) MacInnis
Cc: Lowell Winger; Jvt-Experts (E-mail); 'Barry Haskell'; JVT-CABAC-AHG
Subject: [jvt-experts] RE: [jvt-CABAC] Proposed work items

Now, that I think more about it, I tend to agree with Sandy, although for different reasons ... even defining the loop filter in two passes doesn't drastically change the worst case computational performance (worst case occurs when each macro-block is encoded as a separate slice, thus 1/2 of all filtering will be in the second pass).

Any way, if we have a maximum slice size alone, having to evaluate the loop filter for almost the entire frame in a separate pass reduces the efficacy of this scheme ... there are other parallelization schemes, which are more irregular in assignment of duties, that can have better performance. Thus, I would be more reluctant to put restrictions which may result in some quality loss for questionable performance gains.

Best,

Krishna

"Sandy (Alexander) MacInnis" <macinnis@broadcom.com> on 09/16/2002 04:47:52 PM

Please respond to "Sandy (Alexander) MacInnis" <macinnis@broadcom.com>

To: Krishna Ratakonda/Watson/IBM@IBMUS, "Lowell Winger" <lwinger@videolocus.com>, "Jvt-Experts (E-mail)" <jvt-experts@mail.imtc.org>
cc: "'Barry Haskell'" <bhaskell@apple.com>, JVT-CABAC-AHG <jvt-CABAC@HHI.DE>
Subject: [jvt-experts] RE: [jvt-CABAC] Proposed work items

Krishna, Lowell, Barry, et al,

While this is an interesting idea (below), there is a significant problem with re-defining the loop filter such that inter-slice boundaries are processed after all intra-slice boundaries, as that would require two extra passes of DRAM access of each decoded image: writing the entire partially filtered image to DRAM and then reading it back again, in addition to all the processing and DRAM accesses that would otherwise be required. DRAM bandwidth is already a critical problem for HD AVC decoding.

It is also awfully late in the process to be introducing such major changes to the standard.

--Sandy

At 12:26 PM 9/16/2002, Krishna Ratakonda wrote:

>This is an interesting topic ... parallel slice decoding would be
 extremely
 >useful at high resolutions (HD and above). It will give designers a
 >chance to string 6 SD decoders to form a HD decoder etc. As an aside
 >most hardware
 >MPEG-2 HD encoders process that I know of do use 6 SD encoders strung
 >together with MV sharing.
 >
 >Slice size limit does seem like a good solution to this problem ...
 >however, that
 >would mean that the loop filter would have to be done at the end
 >because
 it
 >goes
 >across slice boundaries. Now, loop filter does take a significant
 >number of cycles of an optimized decoder to perform. And it has to be
 >completed before any processing on the next frame can occur. And it
 >cannot be parallelized nicely across multiple units because of
 >inter-dependencies.
 >
 >There is a simple solution to the loop filter problem: change the spec
 >so that the loop filter at slice boundaries is performed in a second
 >pass after all other non-slice-boundary pixels have been filtered. This
 >would allow 90% of the loop filtering to take place in-line and only
 >the pixels at the slice boundaries need to be filtered later. Does this
 >have any effect on the performance? The answer is probably no ...
 >before the dithering proposal was shot down they were proposing a
 >similar scheme, albeit in a different context, and showed that no
 >appreciable PSNR degradation resulted.
 >
 >This change in loop filtering order in addition to the proposed limit
 >on slice size would greatly improve the parallelizability of the
 >algorithm. I would strongly support both measures ...
 >
 >Best,
 >
 >Krishna
 >
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 Team (JVT) of ISO/IEC
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