From: Kerofsky, Louis <lkerofsky@sharplabs.com>
Sent: Friday, September 13, 2002 9:17 PM
To: 'Gary Sullivan'; Kerofsky, Louis; Karl Lillevold; jvt-experts@mail.imtc.org
Subject: [jvt-experts] Re: Fwd: [jvt_vlc_adhoc] CAVLC for ABT

Gary,

Let me explain how I understand the proposals for using CAVLC with ABT. I agree the design consistency is the most compelling issue. As you mention the 4x4 blocks have different coding methods. Karl proposes to use a single method here. I believe this is the best solution. Additionally, Karl proposes to use the 4x4 CAVLC to code the coefficients in the larger ABT block sizes. This is also an effort to have a design consistency. The major drawback from applying the 4x4 CAVLC to the larger ABT blocks is the change in scan. To avoid loss of performance with CABAC, the CABAC scan should not be changed. The consistency of scan between VLC and CABAC can be exchanged for consistency between VLC coding of all coefficient blocks.

Regards,

Louie

-----Original Message-----
From: Gary Sullivan [mailto:garysull@microsoft.com]
Sent: Friday, September 13, 2002 12:04 PM
To: Kerofsky, Louis; Karl Lillevold; jvt-experts@mail.imtc.org
Subject: [jvt-experts] Re: Fwd: [jvt_vlc_adhoc] CAVLC for ABT

I see the design consistency issue as the most compelling.
Right now we have two different VLC methods to code 4x4 transform
blocks. Three years from now when someone asks us why that is so,
the only explanation we may be able to give them is that we
knew that was strange and we knew the non-ABT one had
better performance but we didn't have time to fix it.
That's a legitimate answer to the question if that needs
to be the answer -- but it's kind of embarrassing.

Best Regards,

-Gary

+> -----Original Message-----
+> From: Kerofsky, Louis [mailto:lkerofsky@sharplabs.com]
+> Sent: Friday, September 13, 2002 11:35 AM
+> To: 'Karl Lillevold'; jvt-experts@mail.imtc.org
+> Subject: [jvt-experts] Re: Fwd: [jvt_vlc_adhoc] CAVLC for ABT
+>
+>
+> Karl,
+>
+> I support your goal of reducing the number of entropy coding

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+> methods in the
+> standard. Efforts to improve the ABT VLC coding are
+> valuable also. One
+> concern is the impact on CABAC efficiency of modifying the
+> scan of ABT
+> coefficients. Based on your current work and Ajay's
+> comments, I would
+> suggest using the CAVLC for all ABT coding with your proposed scan
+> modifications but keep the existing scan for CABAC to avoid
+> any coding loss.
+> Reduce the number of transform coefficient coding methods at
+> the expense of
+> having a separate scan for CABAC. The complexity of the
+> pair (ABT, CAVLC)
+> may be greater than the pair (ABT, VLC) but still less than
+> (ABT, CABAC) so
+> I don't see a big complexity increase. Results of the ABT
+> CAVLC on the
+> interlaced test set would be interesting.
+>
+> Regards,
+>
+> Louie
+>
+>
+> -----Original Message-----
+> From: Karl Lillevold [mailto:karll@real.com]
+> Sent: Friday, September 13, 2002 11:19 AM
+> To: jvt-experts@mail.imtc.org
+> Subject: [jvt-experts] Re: Fwd: [jvt_vlc_adhoc] CAVLC for ABT
+>
+>
+> Dear Experts,
+>
+> ABT in entropy_coding_mode 0 is not efficient, as can be
+> seen from how
+> up to 45% improvement can easily be achieved (Flower, Intra, QP=12).
+>
+> There was also an expressed concern that CAVLC did not work for ABT,
+> and our experiment was a simple way to 1) make CAVLC work
+> for ABT, and
+> 2) reduce the number of transform coefficient entropy coding methods
+> in the standard.
+>
+> However, we do not feel very strongly about either
+> improvement, and we
+> would gladly not do any more work on the subject, if the experts feel
+> there is no need for CAVLC for ABT.
+>
+> Best regards,
+> Karl L.
+>

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+>
+>
+> Friday, September 13, 2002, 10:29:39 AM, you wrote:
+>
+> > -----Original Message-----
+> > From: Luthra Ajay-MGI1164
+> > Sent: Friday, September 13, 2002 10:12 AM
+> > To: 'jvt_vlc_adhoc@yahoogroups.com'
+> > Cc: Mathias Wien (wien@ient.rwth-aachen.de)
+> > Subject: RE: [jvt_vlc_adhoc] CAVLC for ABT
+>
+>
+> > Yes, we have similar concern. The current scan gives about
+> 5+% bit rate
+> > saving for Interlace material. By changing it we are
+> giving that up. Even
+> if
+> > CAVLC with changed scan can get that 5% back, we are where
+> we started.
+> Plus,
+> > it will hurt CABAC based coding (i.e. ABT+CABAC) unless we
+> now have two
+> > different scans - one for CAVLC and one for CABAC.
+>
+> > On a different note, do we really need CAVLC for ABT? ABT
+> as it is adding
+> > enough complexity. CAVLC will add further. I am not sure I
+> see why to do
+> > that. In baseline there is no CABAC so CAVLC helps. ABT is not in
+> Baseline.
+> > In Main profile, with CABAC, why to add the extra
+> complexity of CAVLC over
+> > ABT.
+>
+> > Regards,
+> > Ajay
+>
+> >> -----Original Message-----
+> >> From: Kerofsky, Louis [mailto:lkerofsky@sharplabs.com]
+> >> Sent: Friday, September 13, 2002 9:39 AM
+> >> To: jvt_vlc_adhoc@yahoogroups.com
+> >> Cc: Mathias Wien (wien@ient.rwth-aachen.de)
+> >> Subject: RE: [jvt_vlc_adhoc] CAVLC for ABT
+> >>
+> >>
+> >> Karl,
+> >>
+> >> Thank you for your work. Changing to the CAVLC_ALL_4x4
+> is a definite
+> >> improvement. I have concerns about changing the scan order
+> >> in the non-4x4
+> >> block sizes used by the ABT. The improvement of the ABT is

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+> >> seen primarily
+> >> on interlaced material. As I recall Motorola had
+> >> investigated the scan used
+> >> by the ABT and found sizable improvement with the scan
+> they proposed.
+> >> Before changing the ABT scan we need evaluation on the
+> >> interlaced test set.
+> >> Can anyone comment on modifying the scan used with the ABT on
+> >> interlaced
+> >> material?
+> >>
+> >> Regards,
+> >>
+> >> Louie
+> >>
+> >> -----Original Message-----
+> >> From: Karl Lillevold [mailto:karll@real.com]
+> >> Sent: Thursday, September 12, 2002 5:58 PM
+> >> To: jvt_vlc_adhoc@yahoogroups.com
+> >> Subject: Re: [jvt_vlc_adhoc] CAVLC for ABT
+> >>
+> >> Please find attached a version of JM-4.0c where the two modes
+> >> discussed below are implemented.
+> >>
+> >> in defines.h, #define CAVLC_ALL_BLK_SZ to use CAVLC for
+> all ABT block
+> >> sizes and #define CAVLC_ALL_4x4 to use CAVLC for all 4x4
+> blocks (incl.
+> >> those of ABT coded macroblocks). Both of these modes are
+> both in the
+> >> encoder and decoder. It is also possible to disable CAVLC
+> completely
+> >> in the encoder with the CAVLC define. The only mode not
+> possible is
+> >> what is defined in the FCD (CAVLC for chroma +
+> macroblocks not in ABT
+> >> mode), but this can be reproduced with the standard
+> JM-4.0c without
+> >> any changes.
+> >>
+> >> I have also attached a slightly updated results document,
+> where the
+> >> results match this latest software. The changes are very minimal.
+> >>
+> >>
+> >> Wednesday, September 11, 2002, 4:18:26 PM, you wrote:
+> >> > ABT in VLC mode (entropy_coding_mode is 0) has relatively poor
+> >> > compression efficiency when compared with the baseline 4x4
+> >> mode. This
+> >> > is because the run-level token coding of transform
+> coefficients for
+> >> > 8x8, 8x4, 4x8, and 4x4 blocks is not as efficient as

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+> CAVLC coding of
+> >> > 4x4 blocks, and in the current FCD, CAVLC is used only
+> on chroma and
+> >> > macroblocks not in 4x4 mode.
+> >>
+> >> > We thought about modifying CAVLC to be able to encode
+> these larger
+> >> > block sizes, but in the spirit of simplicity, we tried
+> a method for
+> >> > which CAVLC 4x4 coding is used unchanged for 8x8, 8x4,
+> and 4x8. This
+> >> > works by modifying the scan order for these block sizes,
+> >> and then code
+> >> > them as four (for 8x8) or two (for 8x4 and 4x8) 4x4 blocks using
+> >> > standard CAVLC. Figures showing the modified scan orders
+> >> are attached
+> >> > as a PDF document.
+> >>
+> >> > Another option is to modify the FCD such that CAVLC
+> coding of 4x4
+> >> > block sizes for macroblocks in ABT mode, is allowed. This also
+> >> > improves the ABT efficiency in VLC mode, but not as much as
+> >> the method
+> >> > described above (up to 8% lower)
+> >>
+> >> > In both cases, a change to the FCD is required to fix
+> this rather
+> >> > serious inefficiency. As you can see from the attached
+> >> spreadsheet, up
+> >> > to 45% improvement can be measured (Intra Flower CIF
+> QP=12). For a
+> >> > more reasonable QP of 24, the improvement for the same
+> clip is still
+> >> > 20%. The gains are highly variable, so I suggest you look at the
+> >> > spreadsheet. This compares four modes:
+> >>
+> >> > reference : no CAVLC for any blocks
+> >> > non-ABT : use CAVLC for all macroblocks not encoded
+> in ABT mode,
+> >> > as well as chroma (this is the FCD)
+> >> > all 4x4 : use CAVLC for all 4x4 blocks (incl ABT mode blocks)
+> >> > all blk sz: use CAVLC for all block sizes (with change
+> >> described above)
+> >>
+> >> > Thoughts? Both modifications should be relatively simple. The
+> >> > modification with CAVLC everywhere is probably a little
+> more complex
+> >> > editorially, but simpler in the sense that there would be
+> >> no need for
+> >> > run-level tokens any longer. Also note that it does not
+> involve any
+> >> > change to the CAVLC text, except the section on selection

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+> >> of VLC table
+> >> > for NumCoeff_TrailingOnes, where it would have to be
+> >> defined what the
+> >> > number of coefficients per block is, for ABT coded
+> macroblocks. This
+> >> > change is needed no matter what is decided, since it is already
+> >> > missing.
+> >>
+> >> The use of the jvt_vlc_adhoc list is intended only for the
+> >> video coding
+> >> standardization work conducted by the Joint Video Team (JVT)
+> >> of ISO/IEC
+> >> JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).
+> >>
+> >> To unsubscribe from this group, send an email to:
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+> >> ---
+> >> -------~->
+> >>
+> >> The use of the jvt_vlc_adhoc list is intended only for the
+> >> video coding standardization work conducted by the Joint
+> >> Video Team (JVT) of ISO/IEC JTC1/SC29/WG11 (MPEG) and ITU-T
+> >> SG16 Q.6 (VCEG).
+> >>
+> >> To unsubscribe from this group, send an email to:
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+>
+> > The use of the jvt_vlc_adhoc list is intended only for the
+> video coding
+> standardization work conducted by the Joint Video Team (JVT)
+> of ISO/IEC
+> JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).
+>
+> > To unsubscribe from this group, send an email to:
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+>
+>
+>
+> > Your use of Yahoo! Groups is subject to
+> http://docs.yahoo.com/info/terms/
+>
+>
+> > ===8<===========End
+> of original message text==========
+>
+>
+> > ---
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+> video coding
+> standardization work conducted by the Joint Video Team (JVT)
+> of ISO/IEC
+> JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).
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standardization work conducted by the Joint Video Team (JVT) of ISO/IEC
JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).

You are currently subscribed to jvt-experts as: lkerofsky@sharplabs.com
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The use of the jvt-experts list is intended only for the video coding standardization work conducted by the Joint Video Team (JVT) of ISO/IEC JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).

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To unsubscribe send a blank email to leave-jvt-experts-12909W@mail.imtc.org

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