

High precision bi-directional averaging



JCT-VC D321

K. Ugur, J. Lainema, A. Hallapuro

Summary

Low complexity profile signals rounding offset for bi-directional averaging.

- 1 bit in frame header to use rounding or truncation
- Encoder uses different cost functions for searching rounding/truncation (duplication of 27 cost functions)

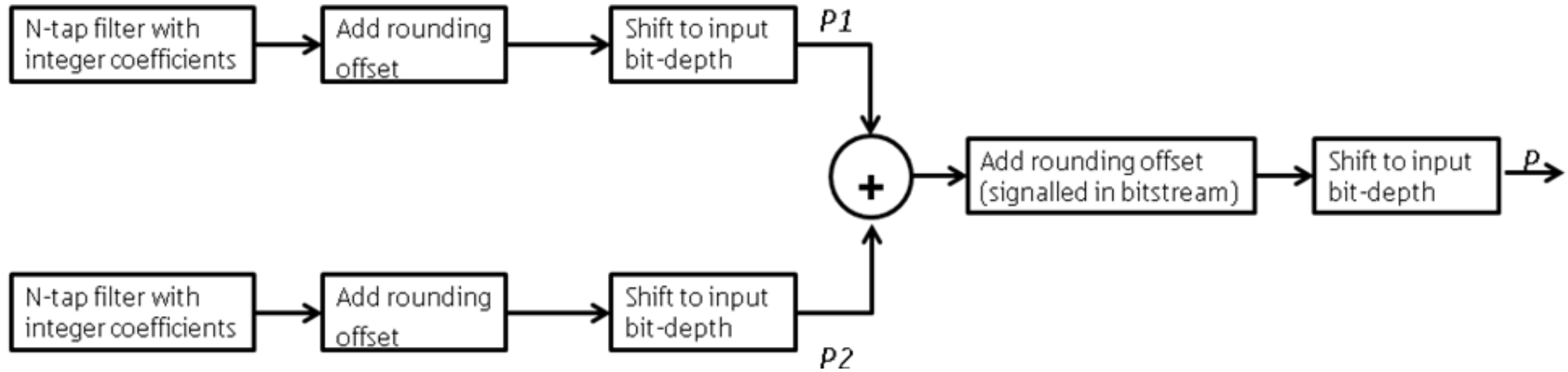
This contribution proposes an alternative way to combat rounding errors.

- Perform rounding as last operation after adding two bi-predictions.

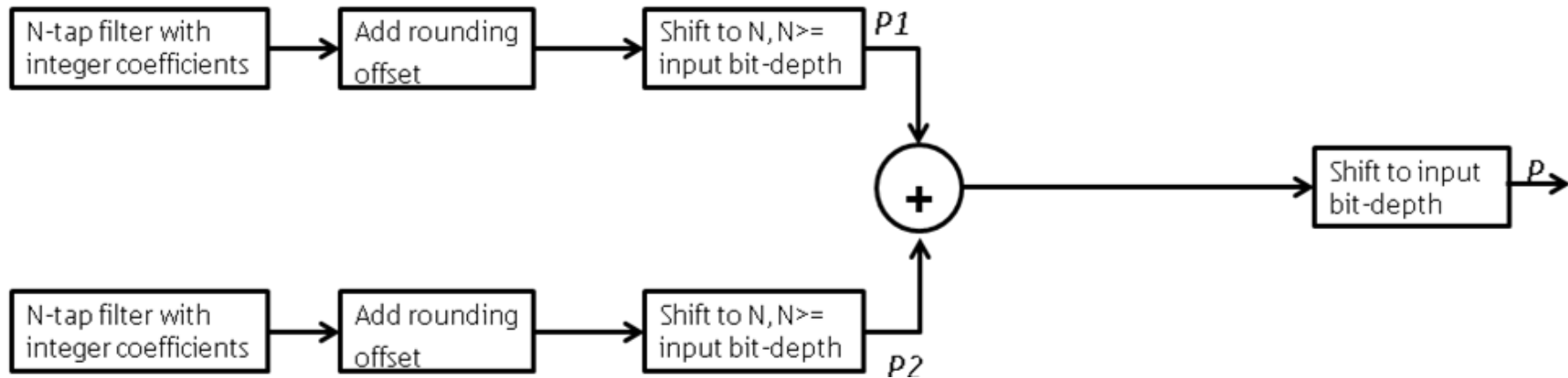
Benefits of the proposal

- Unifies low-complexity and high-efficiency cases.
- Clean-up in the syntax (no need to signal rounding/truncation in the bitstream)
- Clean-up the encoder (no need for different cost functions for rounding/truncation)
- This clean-up comes with slight gain in coding efficiency

Proposal



Current design in bi-prediction



Proposal

Results

	Random access			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.0	0.1	0.2	-0.4	-0.8	-0.3
Class B	0.0	0.0	-0.1	-0.3	-1.1	-0.6
Class C	0.0	0.0	0.0	-0.2	0.0	0.1
Class D	0.0	0.0	0.0	-0.1	0.2	0.8
Class E						
All	0.0	0.0	0.0	-0.3	-0.4	0.0
Enc Time[%]	98%			95%		
Dec Time[%]	105%			106%		

	Low delay			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	0.0	-0.4	-0.9	0.0	-0.7	-0.4
Class C	0.0	-0.1	-0.1	0.1	-0.2	-0.1
Class D	0.0	-0.8	0.0	-0.1	0.7	0.7
Class E	-0.1	-3.8	-3.2	0.6	0.6	-1.4
All	0.0	-1.1	-0.9	0.1	0.0	-0.3
Enc Time[%]	93%			83%		
Dec Time[%]	104%			108%		

Compared to anchor

	Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate
Class A	-1.1	-3.6	-4.2
Class B	-1.4	-6.4	-7.6
Class C	-0.4	-2.5	-2.8
Class D	-0.5	-4.1	-4.1
Class E			
All	-0.9	-4.4	-4.9

	Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate
Class A			
Class B	-1.3	-3.9	-4.9
Class C	-0.7	-1.9	-2.1
Class D	-0.7	-0.8	-1.0
Class E	-1.2	-6.0	-9.4
All	-1.0	-3.0	-4.1

Compared to not performing rounding

Results obtained by modifying the motion compensation only.

- Motion estimation is performed using input precision

Conclusions

Alternative way to combat rounding errors.

- Perform rounding as last operation after adding two bi-predictions.

Benefits of the proposal

- Unifies low-complexity and high-efficiency cases.
- Clean-up in the syntax (no need to signal rounding/truncation in the bitstream)
- Clean-up the encoder (no need for different cost functions for rounding/truncation)
- This clean-up comes with slight gain in coding efficiency
- All the operations are still done in 16-bit