Core Experiment on LPC-based Block-Matching Prediction for H.BWC

March. 2025

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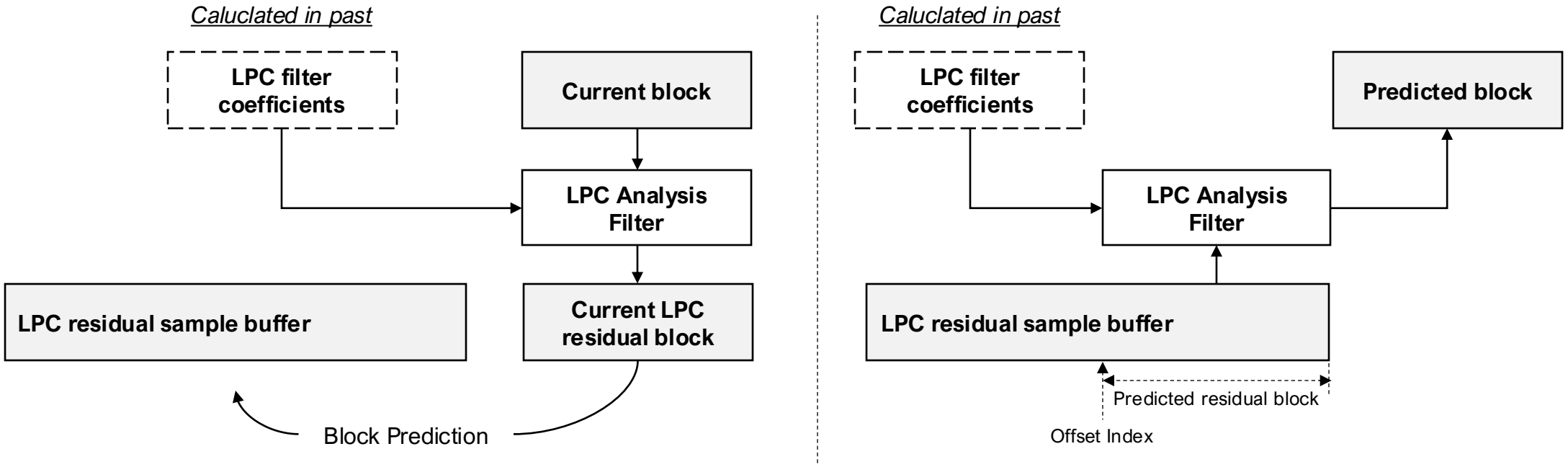
Motivation

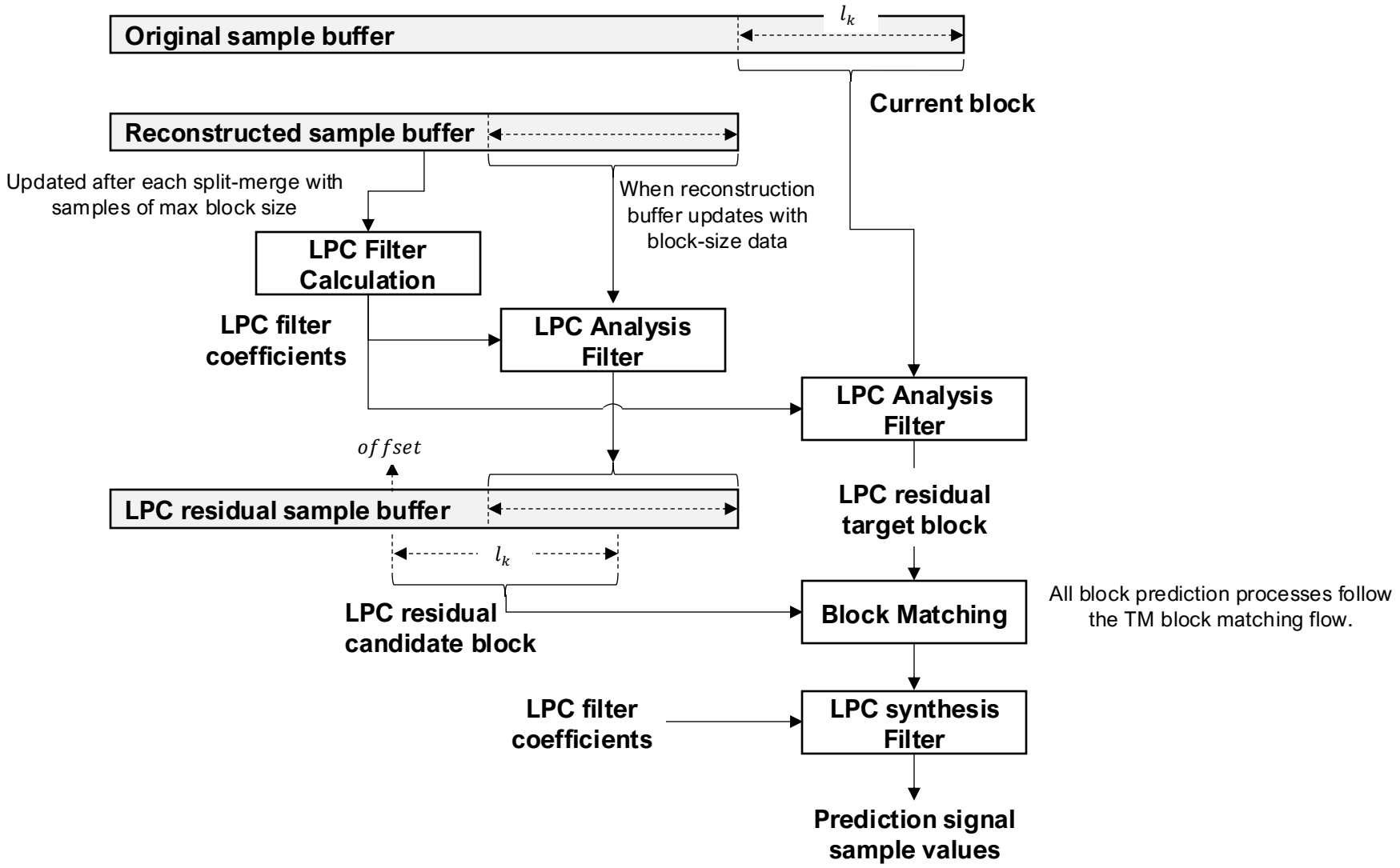
- Biomedical Waveform Characteristics
  - Biomedical signals such as EEG, ECG, and EMG exhibit diverse and non-stationary characteristics.
- LPC Framework
  - Widely used in speech and audio coding to model the spectral envelope and remove short-term redundancy.
- LPC-based Block Matching Prediction
  - Suppresses stationary patterns using LPC analysis, enabling better prediction of long-term redundancies.

Proposed Method

- Block Matching in the LPC Residual Domain
  - Requires an extra buffer, but no LPC coefficients are transmitted
  - The prediction mode process itself follows the conventional approach.

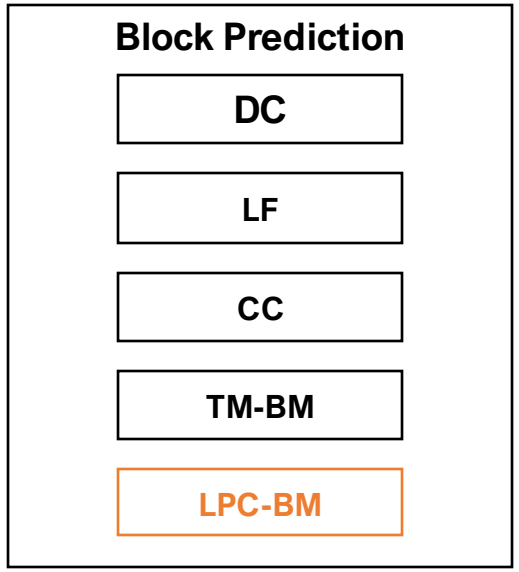


Proposed Method (Detailed)



Syntax

- We simply add LPC-BM into block prediction candidates
  - All syntax are directly adopted from the TM-BM.



Evaluation

(Exclude 1.125, 1.5 step size for ECG, 1 for EMG, 1.125 for EEG)

		BD-rate1 (%)	BD-rate2 (%)	ΔEncT(%)	ΔDecT(%)
Combined	MIT_ECG	-0.298	-0.299	147.90	27.24
	Ozdemir_EMG	-0.011	-0.010	124.90	61.39
	CHBMIT_EEG	0.005	0.005	94.97	*102.20
	NMR55_EEG	-0.057	-0.070	148.79	52.45
	NMR57_EEG	-	-	-	-
Independent	MIT_ECG	-0.297	-0.299	150.41	26.54
	Ozdemir_EMG	-0.012	-0.011	151.19	32.19
	CHBMIT_EEG	-0.003	-0.001	205.70	32.19
	NMR55_EEG	-0.134	-0.238	179.83	61.31
	NMR57_EEG	-0.034	-0.034	120.15	41.77

*: Due to time constraints, decoding was performed while NMR55_EEG(Combined) encoding.

Conclusion & Future Works

- Applied the LPC-based method originally effective in our CfP response to the TM framework.
- Achieved relatively better results on ECG data by modeling the spectral envelope and removing short-term redundancy.
- We did not optimize parameters or complexity due to time constraints. Threrefore we plan to optimize our method for future works