ABSTRACT

Background frame based video coding achieves a remarkable compress performance for surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saved compared to HM12.0-S.

Index Terms— Surveillance video coding; HEVC; rate control; background reference

1. INTRODUCTION

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

1. INTRODUCTION

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

1. INTRODUCTION

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.

Nowadays, BG-frame based video coding method achieves remarkable compress performance on surveillance video coding. In this paper, an improved Advanced Motion Vector Prediction (AMVP) scheme for surveillance video coding is proposed to make Motion Vector Prediction (MVP) more accurate when prediction unit (PU) references background (BG)-frame. Considering the correlations among the spatial PUs, the proposed method utilizes the Motion Vectors (MV) of spatial PUs which reference BG-frame to recalculate MVP, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saving compared to HM12.0-S.
is the start position for a 4 × 4 block in PU. R is a search range with (x, y) as the center. Besides, the corresponding MV for block which starts at (sx, sy) is recorded in Ax and Ay at position (sx/4, sy/4), and the search range should be R/4 in Ax or Ay. So in the search range, we can find some values in Ax or Ay are unequal to zero vector. But not all of the values are useful and it is the key to find the best texture match blocks with the current block. I represents the current frame. Assuming that (q, p) in Ax or Ay are unequal to zero, obtain the absolute difference of pixels between blocks which start at (4q, 4p) and at (sx, sy). Record the value as MV for this block when the absolute difference is less than the threshold (T_th = 80) and is the minimum. Otherwise, if the absolute difference value is larger than T_th or all values in the search range equal to zero vector, set the 4 × 4 block zero MV. Moreover, add MV of every block in PU and get a new MVP.

For most of the PUs which reference BG-frame, MVS equal zero vector. So, we adopt zero motion vector as the first candidate and our new MVP as the second candidate, thus obtaining a new MVP candidate list. As for temporal candidate, current PU references BG-frame but the two co-located PUs in AMVP may reference other frames. Besides, the recorded spatial MVS are enough for prediction. So we do not take the temporal candidates into consideration when reconstruct the new MVP candidate list.

### 3. EXPERIMENTAL RESULTS

The experimental platform is HM12.0-S which adopts the long-term reference mechanism[2] based on background modeling method of SWRA in [1]. We utilize surveillance videos from the dataset of PKU-SVD-A [4] [5], including four 720×576 (sd) and three 1920×1080 (hd) videos, as shown in Figure 2. For the real-time transmission of surveillance videos, the experiment is conducted on the low-delay configuration with common test conditions [3].

As shown in Table 1, our proposed scheme achieves an average bit-rate saving of 0.17% compared to HM12.0-S. Coding performance is related to the resolutions and complexity of videos.

### 4. CONCLUSION

In this paper, an improved AMVP scheme for surveillance video coding is proposed to take advantage of correlations among the spatial PUs which reference BG-frame. The proposed method takes the MVS of spatial PUs which reference BG-frame into consideration, and reconstruct the MVP candidate list when current PU references BG-frame. Results show that our scheme averagely achieves 0.17% bit-rate saved compared to HM12.0-S.

### 5. ACKNOWLEDGMENTS

This work is partially supported by the National Basic Research Program of China under grant 2015CB351806, the National Natural Science Foundation of China under contract No.61471042 and No.61390515.

### 6. REFERENCES


