Frame-wise and Spatial Integration based High Frame Rate FPGA Design for Classification in Unstable Video

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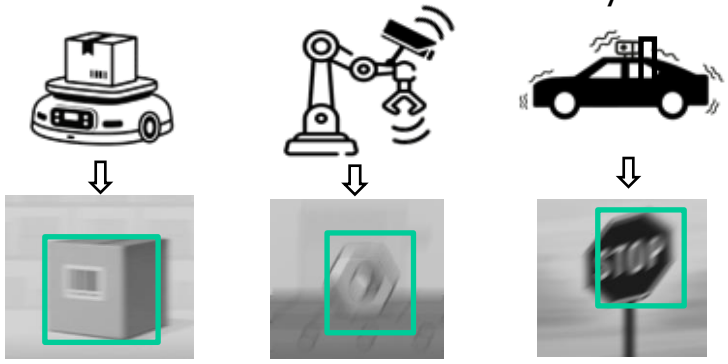
Background

- Unstable visual environment in many industries

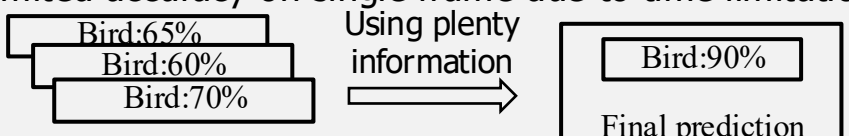


Challenges

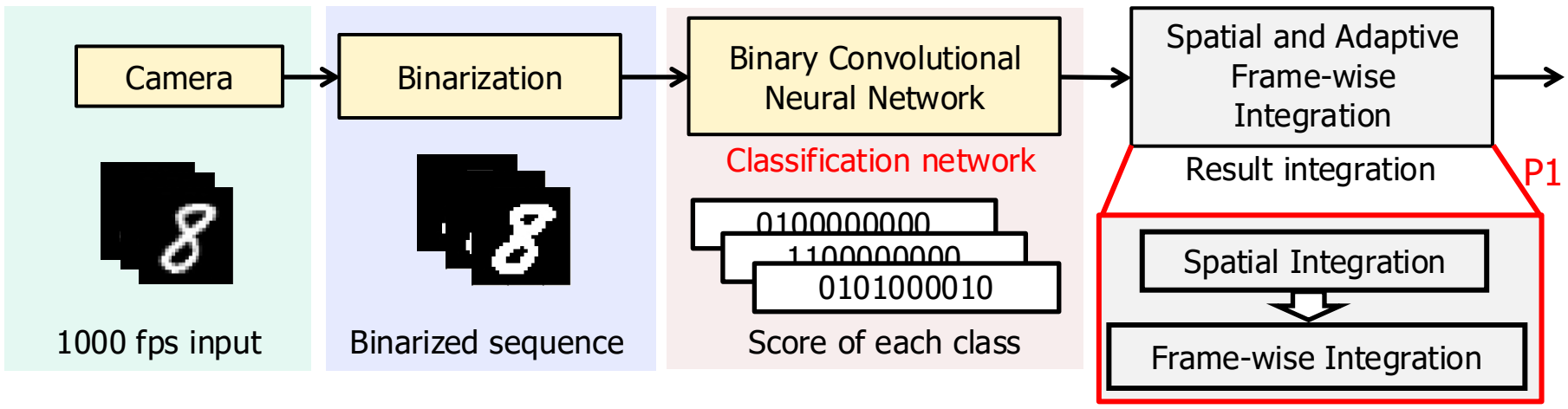
Conventional 60 fps: suffers blurry images

New 1000 fps: clear images but short time

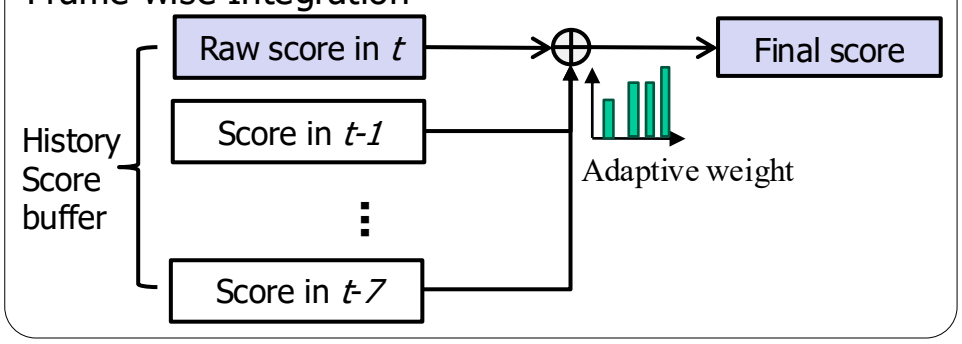
Limited accuracy on single frame due to time limitation



Proposals



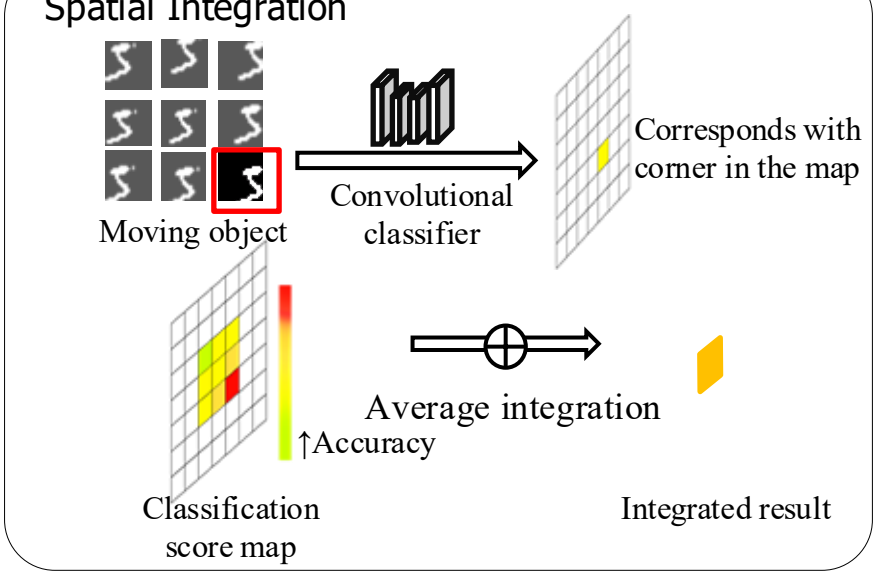
Frame-wise Integration



Adaptive Frame-wise Weight Selection

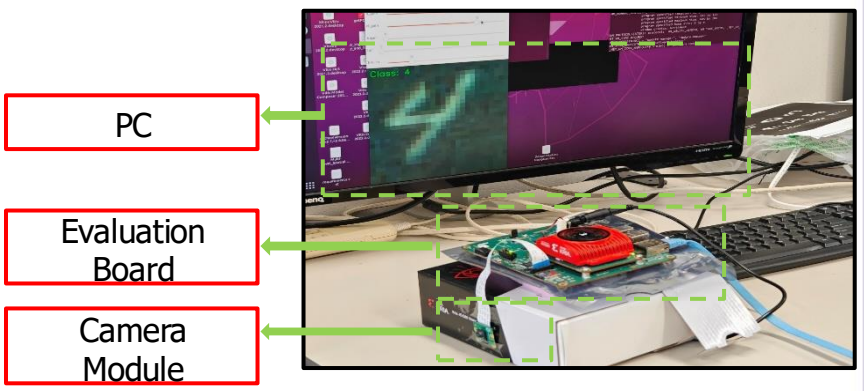
	Same with before	Different from before
One class detected	**Higher** weight	**Medium** weight
Multiple classes detected	**Medium** weight	**Lower** weight

Spatial Integration



Experiment and Demonstration

Evaluation	Accuracy
60 fps Binary CNN	51.8%
+ 1000 fps	60.5%
+ 1000 fps + Smoothing（From RW）	83.1%
+ 1000 fps + P1.1	92.2%
+ 1000 fps + P1.1 + P1.2（After Midterm）	93.0%



Conclusion

- Evaluation shows that proposed method achieves 93.0% accuracy, outperforming the baseline by 41.2%.

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