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Face anti-spoofing to combat mask attacks: A remote photoplethysmography approach

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OBJECTIVES

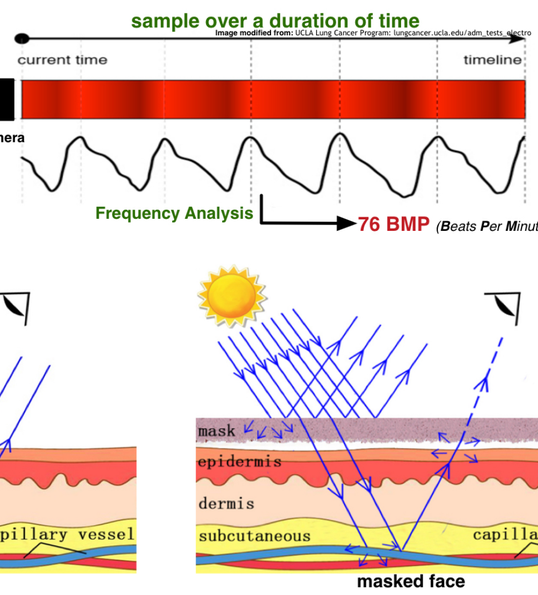
1. To effectively detect the 3D mask attack with different mask materials and qualities, a new liveness cue is proposed by analyzing heartbeat signal through remote photoplethysmography (rPPG).
2. To precisely identify the heartbeat vestige from the observed noisy rPPG signals under practical lighting conditions, A rPPG correspondence feature for 3D mask face anti-spoofing is proposed.

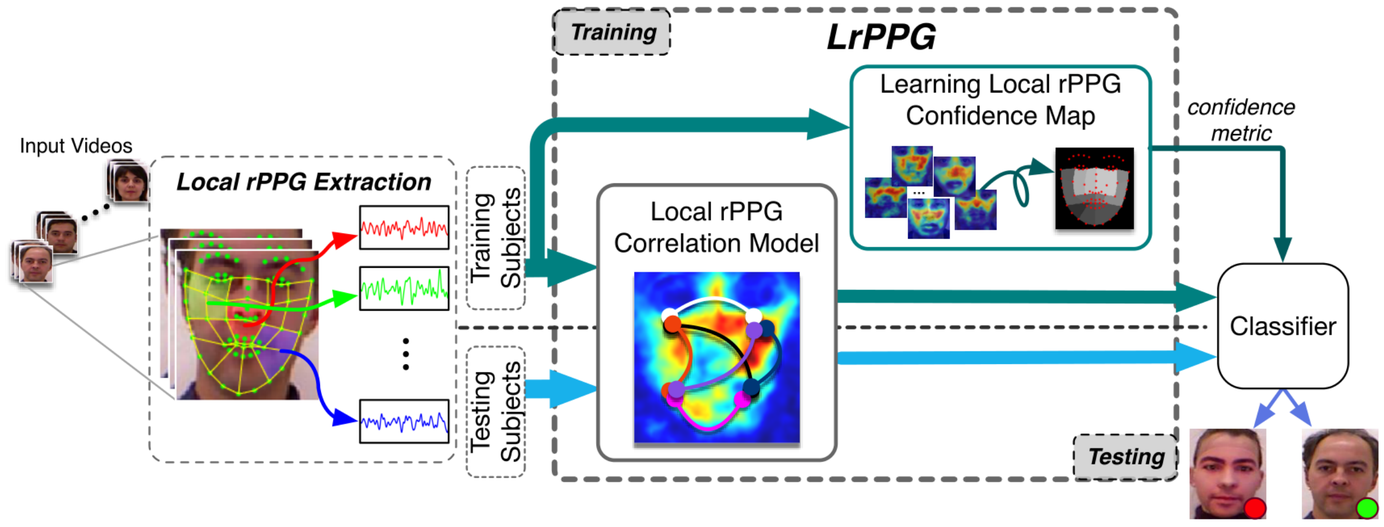
HIGHLIGHTS

Why rPPG Works for 3D Mask Face Anti-spoofing?

- rPPG measures the heartbeat based on the color variation of facial skin when the heart pumps blood during a cardiac cycle.
- Heartbeat signals can be observed on genuine faces while not on masked faces since the mask blocks the light from the facial skin

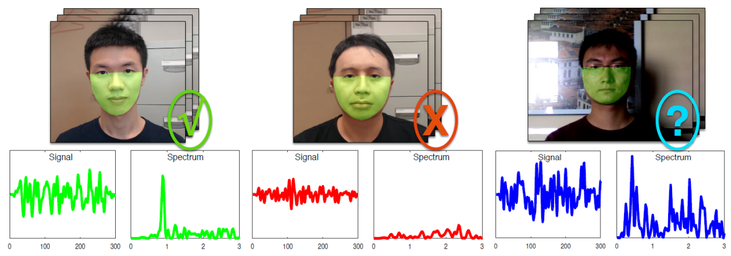
3D Mask Face Anti-spoofing using Local Remote Photoplethysmography [1]

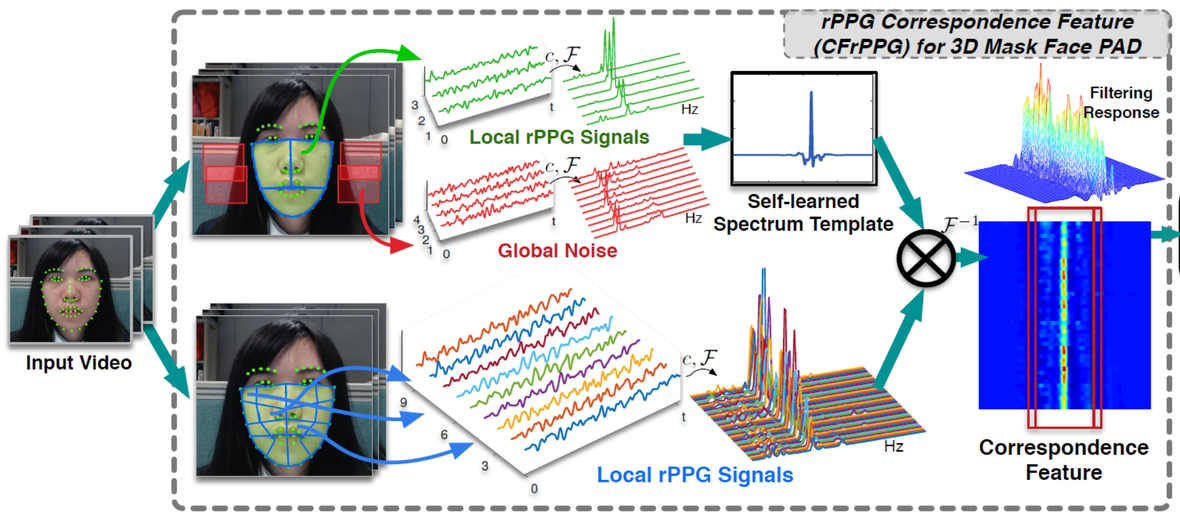




rPPG Correspondence Feature for 3D Mask Face Anti-spoofing [2]

- rPPG signal could be noisy on genuine face under poor lighting condition → false rejection.
- Identify the heartbeat information from the observed noisy rPPG signals





The HKBU 3D Mask Attack with Real World Variations Database [3]

http://rds.comp.hkbu.edu.hk/mars/

SELECTED PUBLICATIONS

1. S. Q. Liu, P. C. YUEN, S. Zhang, and G. Zhao , “3D Mask Face Anti-spoofing with Remote Photoplethysmography,” The European Conference on Computer Vision (ECCV), 2016.
2. S. Q. Liu, X. Lan, and P. C. YUEN . “Remote Photoplethysmography Correspondence Feature for 3D Mask Face Presentation Attack Detection,” The European Conference on Computer Vision (ECCV), 2018.
3. S. Q. Liu, B. Yang, P. C. YUEN, and G. Zhao, “A 3D Mask Face Anti-spoofing Database with Real World Variations,” Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops, 2016.