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Overview of the Project  
We are seeking your expertise in developing a robust pipeline for the collection of remote  
photoplethysmography (rPPG) signals and subsequent heart rate calculation.  
The primary objective of this project is to collect highly accurate rPPG signals while  
minimizing mean square error. The input sensor for signal collection will primarily be a  
camera, with various specifications ranging from 2MP to 6MP or even a web streaming link  
providing live streams. The parameters of these streams, including FPS (frames per second),  
bitrate, height, width, and codecs, may vary significantly. Hence, it is imperative to build a  
robust pipeline capable of controlling and standardizing these variables to ensure consistent  
rPPG signal generation.  
  
Key Tasks  
1. Develop a Pipeline Control System: Design and implement a pipeline control system  
capable of managing FPS variation, bitrate fluctuation, and stream dimension  
variations. This system should be flexible enough to accommodate different camera  
specifications and streaming sources.  
  
2. Standardize Video Collection Pipeline: Create a standardized video collection pipeline  
to ensure consistent rPPG signal generation across different camera types and  
streaming sources. This pipeline should include procedures to account for variations  
in lighting conditions, camera angles, and skin tone(PSNR).  
  
3. Signal Processing for rPPG Extraction: (Supervised or unsupervised your perspective)  
Develop algorithms for extracting rPPG signals from the collected videos. These  
algorithms should prioritize accuracy and reliability while minimizing noise and  
artifacts. A signal with low MSE high SNR values as well as Pearson correlation  
coefficient beyond 0.90.  
  
4. Heart Rate Calculation: Utilize the extracted rPPG signals to calculate heart rates  
accurately. Ensure that the heart rate calculation algorithm accounts for variations in  
signal quality and noise levels.  
  
Expected Deliverables  
1. Detailed design specifications for the pipeline control system and video collection  
pipeline.  
  
2. Implemented pipeline control system capable of managing FPS, bitrate, and stream  
dimensions.  
  
3. Standardized video/stream collection pipeline.  
  
4. Signal processing algorithms for rPPG extraction.  
  
5. Heart rate calculation algorithm integrated with the rPPG extraction module.  
  
6. Comprehensive documentation outlining the implementation details, testing  
procedures, and performance evaluation metrics.