Deep-Learning Based Solution for Male Reproductive Health Self-Evaluation at Home

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Purpose: This project aims to develop CaMAS, an AI-based biomedical imaging solution for at-home screening of male reproductive health. The goal is to create an accessible, low-cost, and accurate solution that can evaluate core semen parameters without coming to medical centers or requiring staining procedures. Procedure: CaMAS integrates a connection module with a smartphone interface to record real time sperm videos. It utilizes advanced computer vision techniques and deep learning models to automatically analyze three WHO-standard semen parameters: sperm concentration, motility, and morphology. The system was trained on 2,757 videos and 1,540 images from public datasets (VISEM, MHSMA), and validated using clinical samples analyzed by a CASA system at Hanoi Medical University Hospital. Results: CaMAS demonstrated strong correlation with laboratory-based diagnostics across all three evaluated parameters. A key innovation of the system is its ability to assess sperm morphology without chemical staining, preserving sample integrity and simplifying the process. The solution maintained high performance across various smartphone models, confirming its portability and compatibility. Conclusion: CaMAS offers a user-friendly, cost-effective, and accurate solution for male fertility screening outside of clinical settings. It addresses critical diagnostic gaps in resource-limited environments and promotes proactive lifestyles for men. Future improvements will include expanding semen analysis capabilities and integrating cloud computing to enhance data processing and storage efficiency.

Awards Won: