A Deep-learning-based Danger Monitoring System for Infants

一、 **Abstract**

When taking care of the infant, the baby caregiver may not be able to pay attention to the status of the baby at any time, which may cause the infant to suffer from unpleasant breathing due to overflowing milk, turning over, sleeping on the stomach, etc. In addition, the existing products use multiple sensors to detect the state of the infant, which has a single function and many restrictions on use, resulting in poor convenience.

Therefore, this paper proposes a danger detection system based on deep learning technology, focusing on baby images: First, the SSD algorithm and the RetinaFace algorithm is uesd to detect infant's face. Then, the ResNet50 is used to train the model to analyze whether the infant's face is obscured by foreign objects other than pacifiers, and identify the four basic postures: lying on the back, lying on the stomach, sitting and standing. Therefore, when the system inputs an infant video, the model can recognize that the infant's posture may be in a dangerous state or it's face is covered by a foreign object, , and the caregiver can be immediately alerted.

In this paper, we exploit the time advantage of SSD algorithm detection. On average, it takes only 0.04 seconds to detect each infant image with 99% accuracy. Although it takes a long time to detect an infant's face using the RetinaFace algorithm, its accuracy, precision, and recall rate are all as high as 99%.

The face occlusion recognition model and the posture recognition model for danger monitoring also have an accuracy of 99%.

Additionally, since there are currently no publicly available infant datasets, the infant data used in this research are all captured and preprocessed from online pictures and videos of real infants.

Keywords: Infant danger detection, Infant face detection, Deep learning, Sudden infant death syndrome