

ABSTRACT

In today's fast-paced world, effective management and analysis are crucial for maintaining security and enhancing business productivity, particularly as the number of enterprises and the size of enterprises rise. According to a recent report from the General Statistics Office of Vietnam, between 2016 and 2019, there was an average annual increase of 9.8% in the number of enterprises, which is higher than the average annual growth rate of 8.1% observed between 2011 and 2015. Moreover, the behavior of employees can be difficult to manage, and employers can increase productivity if they have valuable information from human behavior. Therefore, it is necessary to implement modern technology, specifically AI, into monitoring systems in order to reduce costs and increase productivity.

However, the majority of current AI implementations rely on centralized servers, making scaling difficult. This thesis proposes a novel AI module that can be installed on edge devices, as a means of overcoming this obstacle. Human detection, human tracking, and human feature extraction are the three primary components of the proposed module. All of these components are directly executed on edge devices. This AI module can be utilized to monitor individuals and collect data that can be used to enhance the productivity of businesses.

I aim to achieve efficient human management and analysis by implementing AI models on edge devices that are readily scalable. The algorithms utilized in this thesis have been successfully implemented on Jetson Nano devices with low computational capability while maintaining above 10 FPS for less than seven people in a single frame. A prototype of this module has been put into practical use and examined in room 405, B1 building at Hanoi University of Science and Technology. The proposed module has the potential to revolutionize office human resource management and analysis, thereby enhancing office security and productivity while reducing costs.