

# PROTOTYPE UBIQUITOUS VISUALIZATION SYSTEM BASED ON AUGMENTED REALITY WITH MOBILE PLATFORM

DU Qingyun<sup>1#</sup>, Ren Fu<sup>2</sup>, Rao Jinmeng<sup>3</sup>, and Qiao Yanjun<sup>4</sup>  
1,2,3,4 School of Resource and Environmental Science,  
Wuhan University, China  
qydu@whu.edu.cn

With the rapid development of mobile Internet, outdoor augmented reality system is used in the more and more scenarios, such as social networking, shopping online, entertainment, etc. Augmented reality system is at the heart of the design of the tracking and register algorithm, the mainstream algorithm is mixed tracking registered thought, the visual identification tracking registration is the key in hybrid registration algorithm, the traditional algorithm relies on extracting the feature points, but the large amount of calculation and low accuracy affects the efficiency of tracking and register. Along with the deep learning thought in the field of computer vision, the image recognition model based on convolution neural network has also been widely used, and experimental results show this new algorithm greatly improves the image recognition accuracy and efficiency. This paper studies many convolution neural network models for image classification and target detection of, analyses the advantages and disadvantages of each model, and on the basis of SSD excellent convolution neural network (single detection model) model changes the front three layers network structure, reduces the depth of the network, designs the different aspect ratio of the default frame, to simplify the model used to identify outdoor geographical target. Referred to ImageNet and PASCAL VOC 2007 training sets, this paper collects experimental data and designs the training and prediction data sets, and then trains this simplified model on deep learning platform MXNET, as a result, the simplified SSD model, the mAP reaches 58.2% and an image processing time is 0.03s. This paper uses the deep learning thoughts for solving the problem of the tracking and registered in mobile augmented reality system, develops a prototype system with based on sensor of visual perception and visual identification based on the deep learning, this system is using local mobile client mode, takes advantage of the android mobile phone posture and sensor system to obtain the current position information, and the trained simplified SSD model is used as a image recognition of engine, uses GPU to complete the calculation process, in addition, designs of a 2d and 3d information for the local geography target and provides a simple interaction pattern. Finally, in the actual test, the time of process images reach to 1.5s and target recognition confidence is at around 90%.

**Keywords:** Outdoor AR System; Deep Learning; CNN; SSD Model