

Qiaozhi Tan

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Education

School of Information and Electronics, Beijing Institute of Technology

Master of Information and Communication Engineering 09/2021-07/2024

✧ **GPA: 90.67**

Bachelor's Degree in Electronic Information Engineering 09/2017-07/2021

✧ **GPA: 87.73**

✧ Proficient in PyTorch, TensorFlow, Caffe, C/C++, Python, MATLAB, PyCharm, Visual Studio, Linux, Verilog, VHDL, Assembly Language, Vivado

Publication

- ✧ **Qiaozhi Tan**, Zhongqiang Du, Sheng Chen. **Moving Target Detection Based on Background Modeling and Frame Difference**. The Tenth International Conference on Information Technology and Quantitative Management (ITQM 2023), accepted
- ✧ Linbo Tang, Jun Xu, Yuqi Han, Zhongqiang Du, **Qiaozhi Tan**, Shaopeng Liu. **An Autonomous Guided Landing Method of UAVs Based on Monocular Visual Navigation**. Patent for Invention, CN115439761A

Research Experience

Research on Moving Target Detection System Based on UAVs Platform

Supervisor: Chenwei Deng, Linbo Tang 2021.01-Present

- ✧ Took advantage of the high correlation of background between successive frame images, used the traditional modeling algorithm to extract background with a small number of parameters to reduce false detection, and realized a relatively universal fast target detection algorithm by introducing the background information that was constantly updated and iterated by the preorder image information into the frame difference method
- ✧ Wielded C++ and OpenCV libraries to preprocess the image, and utilized Gaussian mixture modeling method to extract and model the background of the input image roughly
- ✧ Utilized the stable and high-speed SURF/ORB algorithm in OpenCV for image registration, and used a variety of image processing technologies, including image filtering, image threshold segmentation and image morphology processing, to process the registered images to further reduce the impact of noise and interference in the images, so as to achieve a frame difference algorithm adapted to dynamic background
- ✧ Designed an iterative processing algorithm, constantly introduced the background information into the three-frame difference method, and updated the background information through the results of each processing, so as to achieve a self-updating iterative algorithm
- ✧ Used OpenCL to accelerate the optimization of the algorithm in the RK3588 development board, realizing the effect of real-time detection

Research on UAVs Guidance System Based on Visual Navigation

Supervisor: Chenwei Deng, Linbo Tang 2020.05-Present

- ✧ Adopted the camera in the pod for monocular imaging, wielded the computer

vision technology, and combined the attitude information of the UAVs to detect and identify the ground runway, obtain the precise position information of the runway in the image, and solve the position information of the UAVs by combining some known position information, so as to realize the autonomous landing of the UAVs without changing the flight control system

- ✧ Employed Caffe deep learning framework, combined with attention mechanism through YOLOv3 object detection technology to extract the target region containing the multi-scale runway from the complex background so as to eliminate the interference of redundant background information in the large field of view
- ✧ Combined the ENet image segmentation technology after pruning and quantization to precisely divide the runway part and the surrounding background in the target area, and fitted the vertices of the runway with high precision by combining the overdetermined equations of the obtained edge information and the optimized least square method
- ✧ Converted from the image coordinate system to the geodetic coordinate system by combining the attitude information of UAVs to obtain its' position information in the geodetic coordinate system, so as to achieve the effect of accurately guiding UAVs to land

Research on Driver Behaviour Recognition Algorithm Based on Video Image

Supervisor: Chenwei Deng

2021.01-2021.06

- ✧ Established an image classification model based on the convolutional neural network and combined image processing and pattern recognition technologies to propose an abnormal driving behavior detection method that could recognize driving behavior in real scenes and was different from the traditional driving behavior recognition technology
- ✧ Used TensorFlow deep learning architecture, based on basic image processing techniques to test and verify the effects of a series of image enhancement, filtering and geometry transformation algorithms; based on the strategy of data enhancement, utilized image binarization, high-frequency noise adding, image mirroring transformation, image rotation and other methods to expand the data set, which was ready for the input data of the training of the network models
- ✧ Tested and verified a series of model optimization measures in deep learning; extracted the driver's behavior features by convolutional layers, and suppressed the models' overfitting problem by maximum pooling, random deactivation and batch standardization layers; adopted a fully connected layer with activation function to complete the final classification and behavior recognition of images
- ✧ Completed the structure design and module definition of the driving behavior recognition system with the top-down system design idea, built the system and designed the interface with the help of PyQt5 framework and the trained model, realizing the recognition of the input driving behavior images, displaying the recognition results, and forming a practical application

Research on Deepfake Recognition Based on EM Algorithm

2020.07-2020.08

- ✧ Identified the camouflaged face images generated by GAN and used the EM algorithm to extract the trace left by the convolutional layer used by the generator in the GAN network
- ✧ Programmed to continuously optimize the extracted traces through the weighted least square method until it could distinguish between real faces and the faces generated through GAN networks