Super-Resolution Summary:

* High resolution has become more and more important to customers for visual impact. HD resolution is 1920x1280, however, most streaming service like video chat cannot handle this kind of resolution since it needs a stable connection of internet. Also, it’s a high cost for customers to purchase a good data plan.
* Super Resolution using Convolution Neural Network can help scale up the resolution of streaming videos by 2 times and 3 times. Compared to traditional Image Processing algorithms like bicubic and bilinear, it can reconstruct more details. Thanks to the advanced hardware, NPU, we are able to super-resolve images or videos in real time on the mobile phone.

Work Summary:

* Worked on Image Quality Assessment (IQA). Evaluated different models trained with different training data with different levels of Gaussian Blurring. Helped the team select the best model based on objective analysis like PSNR, SSIM, Netflix VMAF…etc
* Found the best running time per frame of CSRNet models using different batch size on NPU. Compared the running time between using batches and using small patches of each image.
* Evaluated the blurring metric and found the relation of blurring metric and different Super Resolution models to help select the best model for a corresponding value from blurring metric which can provide a better visual quality based on input videos.
* Investigated more objective Image Quality Assessment algorithms like VIF, Netflix VMAF, ringing metric, blocking metric to best match the visual experience of users.
* Fixed the issue of iVision engine (the app for verifying the pipeline of each model) caused by the datatype conversion. Verified the correctness of the output images in iVision and made sure the pipeline in iVision is correct on NPU and Shader for all Super Resolution models which further helped the team to deploy and test the new models more efficiently.
* Investigated on Image Enhancement method like Contrast Limited Histogram Equalization to increase the visual quality of Super Resolution.
* In charge of the model conversion from different training platform to the format that is needed by Mate20 and Mate10. Tensorflow and Caffe to Cambricon (for NPU) and bin file (for Shader).
* Worked on Ensemble Model. Helped verify the feasibility of the proposed method on synthetic dataset for regression and classification. Contributed to the literature review of the paper of Ensemble Model.
* Worked on data augmentation for video super resolution. Worked on research of different types of noise for input images or sharpening algorithm on label images to best match user’s experience of video calls.
* Worked on the conversion and testing platform for deploying models. This will further help the team to deploy new models more efficiently.