NEXT GENERATION BARCODE SCANNING

The ubiquitous smartphones, tablets, and the upcoming smartglasses and smartwatches radically transform the way we scan barcodes every day. Barcode localization is an important preprocessing step that quickly scans the entire camera image and passes barcode candidates to the actual decoder. An ideal localization algorithm can find barcodes of different symbologies at different scales, orientations and of different blurriness [1].

LOCALIZATION ALGORITHM

We present a robust joint 1D and 2D barcode localization algorithm [1] on the mobile GPU. The barcode probability maps are derived from the edge and corner structures and the color of the pixels. The algorithm requires pixel-wise operations only and is hence suitable for parallel processing on mobile graphics hardware.

MOBILE GRAPHICS PIPELINE

The OpenGL ES 2.0 standard defines the programmable graphics pipeline for embedded devices.

IMAGE PROCESSING ON MOBILE GPU

Image filtering can be reformulated as a rendering task using textures for input as well as for output. The different steps of the algorithm can be implemented as OpenGL ES 2.0 fragment shaders and both 1D and 2D barcode saliency maps are computed directly on the graphics hardware.

OPTIMIZATIONS

- streaming camera images directly to texture memory
- resampling on graphics hardware
- reshuffling vertical and horizontal filter operations
- branch-free code using the built-in step function
- separable filters reduce the number of texture fetches
- reading multiple texels by leveraging hardware interpolation

NEW DEVICES

Parallelization in OpenGL allows portability across a wide range of devices including wearable computers such as the Google Glass or the Samsung Galaxy Gear watch.

CONCLUSION

Our localization algorithm can be applied as a preprocessing step for existing barcode decoder algorithms pushing smartphones one step closer to enterprise-grade barcode scanning.

REFERENCES