GPU Accelerated Multimodal Background Subtraction

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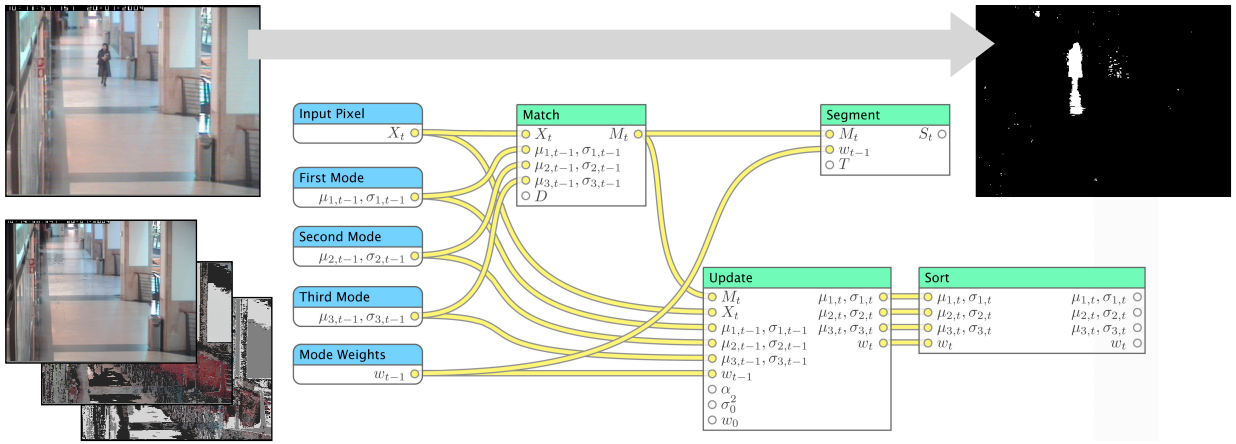
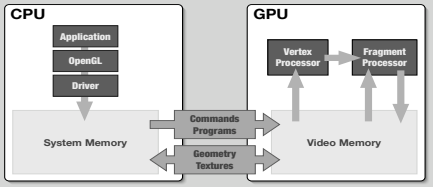
Background Subtraction as a Stream Process

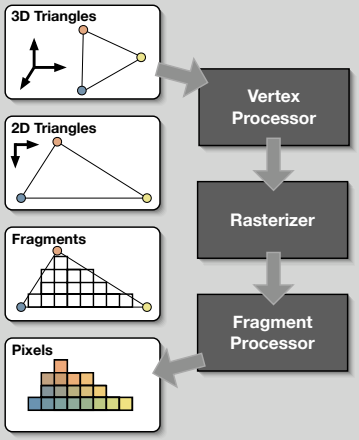


- Each pixel a gaussian mixture model (GMM)
- Calculations are independent – ideal for parallel implementation
- OpenGL pixel data type has insufficient space to store all GMM aspects; additional pixel buffer for weights
- Three element sorting easily realized within GPU constraints
- ‘Core Image’ requires manual optimization for good video performance (mainly in memory management)

GPU Programming Overview

- separate processing unit with dedicated memory
- propriety hardware drivers
- asynchronous transfer between main and video memory; ‘read-back’ is typically slow.





- work within ‘graphics pipeline’ (or use a proprietary library, like CUDA)
- vertex and fragment units are programmable
- similar concepts to stream programming: define how a series of elements (pixels) is produced from one or more input streams
- 4-vector operations
- graphics specific data types
- registers for local variables
- limited support for branching (and looping)