IMAGING WITHOUT PROCESSING

RECORDING IMAGE STREAMS

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STEMMER IMAGING
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JON VICKERS, PRODUCT MANAGER, STEMMER IMAGING
VISION.
CUTTING-EDGE MACHINE VISION TECHNOLOGY
RIGHT.
COMBINING PASSION AND EXCELLENT SERVICE
NOW.
FOR EACH TASK – FOR YOUR COMPETITIVE ADVANTAGE
AGENDA

1. Why?
2. What?
3. How?
4. What is new?
RECORDING IMAGE STREAMS?

Why would anyone want to do that?

- No processing required
  - Visualisation
  - Dumb security
  - Debugging a process by a human: some kind of time-and-motion study
  - Review failures
  - Broadcast – sports
  - High-speed, high-resolution, non-visible... Anything that MV cameras are good at.

- Offline processing
  - Interval events – high-speed events that don’t happen often
  - Developing processing – logging images to allow development
WHAT DOES IT INVOLVE?

You have two main options...

- Save to RAM
- Save to Disk

What are the implications?
SAVE TO RAM

Ram is fast, but limited and not persistent
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Limited in size

- See 8GB
- Win10 Pro 64b supports up to 512GB, but the limit usually is due to the MoBo.

Fast

- 1400MHz, but DDR means effectively 2800MHz. You could read this as 2.8GB/s.

Not persistent

- When the power is off, it is gone! You may need to save down to a disk unless the requirement is transitory
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SAVE TO DISK

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„Spinning disks“ (HDD) aka „Rusty Memory“

• Largest and slowest. Upto 10TB, maybe 200MB/s

„Flash memory“ (SSD)

• Typically smaller and faster. Upto ~4TB, maybe 500MB/s

Hybrid drives

• Combine the two types above – better for fast frequent read/write than sustained writing.
HOW? WHAT HAPPENS IN SAVING DATA?

Saving to RAM is so fast, we don't need to consider it…

Compression?

- Compression puts a load on the CPU to lessen the load on the disk.

A disk (HDD or SSD) is addressed in terms of sectors.

- Sectors are 4096 bytes (512B).
- Files span a whole number of sectors, regardless of real size
- The remaining sector space is written as ‘packing’
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WHAT IS WRONG WITH THIS?

Or at least: ‘wasteful’

Unless you are lucky enough to fit an image into an integer number of bytes, each image-save will also consist of writing some packing data.

Image stream == many images

Packing becomes significant
ANYTHING ELSE?

DirectShow

This allows easy access to a large and freely available range of codecs

- CoDec (Compress, Decompress). Compression to an AVI stream (and decompression by a player).

DirectShow is a Microsoft standard, so playback is straightforward.
Great, let's use that!

- But it only supports 8bit data (256 levels, mono or RGB)
- And it has overheads that introduce limits to the recording bandwidth (either based on framerate or throughput)
HOW CAN WE KEEP UP WITH CAMERA/DISK PERFORMANCE?

Don’t keep to the standard – use a proprietary format

- AVI containers and DirectShow have their limits in data and performance
- Cameras have ever-increasing resolution and frame-rate
- Disks are getting larger and faster

- Why not create an unlimited method of saving that also optimises the data to the disk, to avoid packing?
- Can we save high-bit data too?
CVB MOVIE (CVB 2019)

What’s new?

- By making a proprietary container (not DirectShow), we can optimise for speed.
- By formatting the data into chunks that are multiples of the sector-size we can optimise the writing for speed and disk-space

If we stipulate:

- No compression (low CPU load but high disk load).
- Data must fit into a whole number of sectors (some limitations on image size).
- We will not keep to media player-compatibility

We write data to disk as quickly as the disk can handle it. We’ve optimised the data to the disk.

We have achieved 15000fps & 3GB/s so far and that doesn’t look like the limit.
THANK YOU FOR YOUR TIME

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