IM – An Imaging Tool:
Image Representation, Storage, Capture and Processing
http://www.tecgraf.puc-rio.br/im/

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Overview

IM is a toolkit for Digital Imaging.
It is based on 4 concepts: **Image Representation**, **Storage**, **Processing** and **Capture**. The main goal of the toolkit is to provide a simple API and abstraction of images for scientific applications. IM is free software and can be used for public and commercial applications.

```
imVideoCapture* vc;
vc = imVideoCaptureCreate();
imVideoCaptureGetImageSize(vc,
                           &width,
                           &height);
imVideoCaptureOneFrame(vc,
                       data,
                       IM_RGB);
imVideoCaptureDestroy(vc);
```

- USB
- Firewire/IEE1394
- Analog
- Tv Tuners

- Live Video
- Multiple Sources

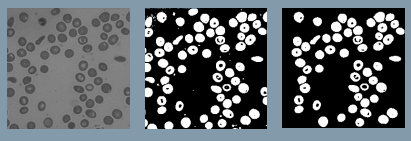
```
imFile* ifl;
imImage* im;
ifl = imFileOpen(file_name, &error);
imFileReadImageInfo(ifl, index,
                    &width, &height,
                    &color_mode,
                    &data_type);
imFileReadImageData(ifl, data,
                    convert2bitmap,
                    color_mode_flags);
value = imFileGetAttribute(if, attrib,
                           &data_type,
                           &count);
imFileClose(ifl);
```

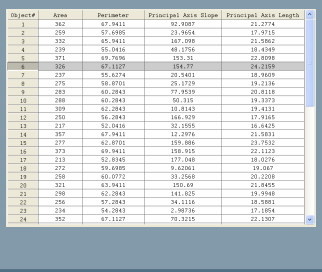
Capture

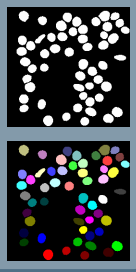
Processing

- Synthetic Reference Images
- Resample
- Quantization
- Geometric
- Color Processing
- Histogram Based
- Threshold
- Arithmetic and Logic
- Tone Gamut
- Convolution
- Rank Convolution
- Binary Morphology
- Gray Morphology
- Domain Transform
- Statistics
- Image Analysis

```
imProcessSliceThreshold(in, out, level1, level2)
imProcessPrune(in, out, connect, size1, size2)
imProcessFillHoles(in, out, connect)
imAnalyzeFindRegions(in, out, connect)
imAnalyzeMeasureArea(in, area)
imAnalyzeMeasurePerimeter(in, perim)
…
```







Representation

- width, height, color_mode and data_type
- color_mode = color_space + flags
- color_space =
  - RGB (nonlinear)
  - MAP (Indexed RGB)
  - GRAY (luma or non color intensity)
  - BINARY (black & white)
  - CMYK (nonlinear)
  - YCBCR (ITU-R 601)
  - LAB (nonlinear)
  - LUV (nonlinear)
  - XYZ (linear)
- flags =
  - ALPHA (NOALPHA) channel
  - TOPDOWN (BOTTOMUP) orientation
  - PACKED (SEPARATED) planes
- data_type =
  - BYTE
  - USHORT
  - INT
  - FLOAT
  - COMPLEX FLOAT

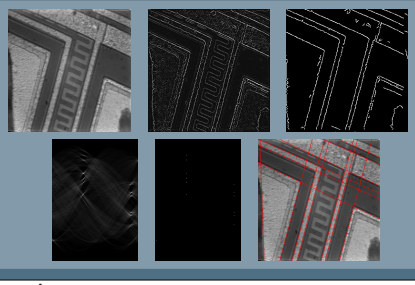
```
imImage* im;
im = imImageCreate(width,
                   height,
                   color_space,
                   data_type);
im = imImageInit(width,
                 height,
                 color_space,
                 data_type,
                 data,
                 palette,
                 palette_count);
im = imImageDuplicate(image);
im = imImageClone(image);
```

Storage

- BMP, PCX, GIF
- TIFF, RAS, SGI
- JPEG, TGA, RAW
- PNM, ICO, PNG
- JP2, AVI, WMV

- Video/Stacks/Volume
- Metadata

```
imProcessCanny(in,out,stddev)
imProcessHysteresisThreshold(in,out,low,high)
imProcessHoughLines(in,out)
imProcessLocalMaxThreshold(in,out,size,min)
imProcessHoughLinesDraw(in1,in2,out)
```



Motivation

- Portable
- C
- Free
- Simple
- Educative
- Scientific
- Reusable

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