



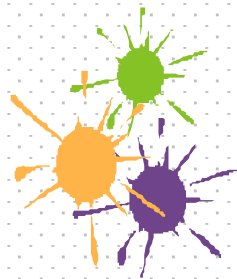
计算机视觉与**OpenCV**介绍

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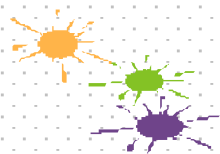




开篇

To CVers:

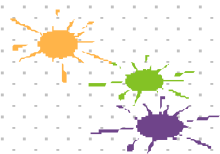
不要相信Video Demo!





目录

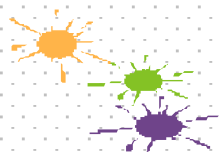
- **OpenCV**简介
- 图像读写，窗口
- 人脸检测
- 双目视觉
- 运动物体跟踪
- **EMCV**

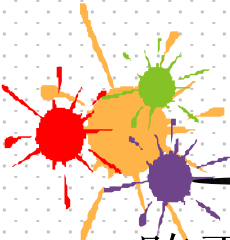




OpenCV简介

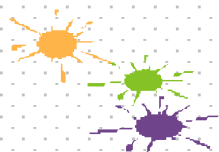
- **OpenCV**提供了一系列图像处理、计算机视觉、模式识别等方面的函数。
- **Intel**发起并一直提供支持，直至**OpenCV 1.0**发布
- 现在由**Willow Garage**提供支持



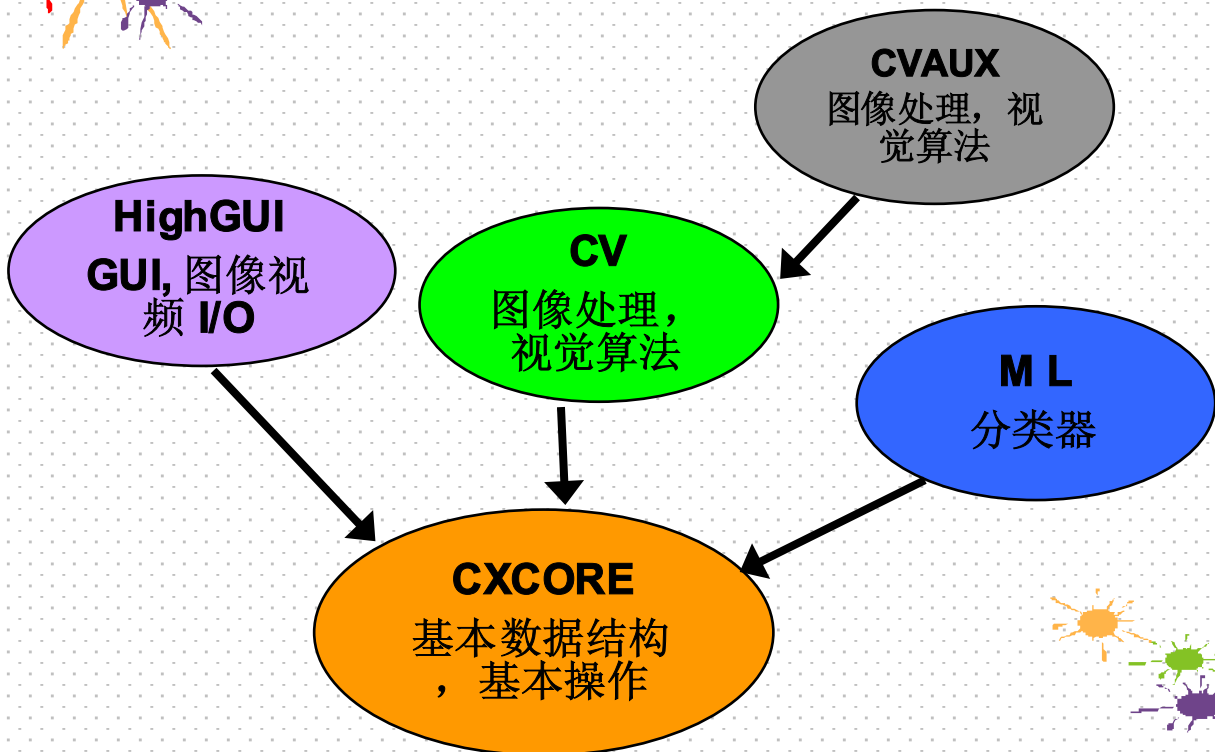


显著特点

- 跨平台：**C/C++**语言，**Windows**，**Linux**
- 开放源代码
- 免费，无论科研还是商业应用
- 速度快
- 使用方便



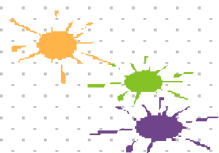
OpenCV构成





第一个小例子

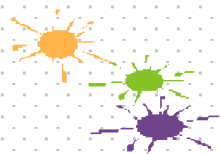
```
#include "cv.h"
#include "highgui.h"
int main( int argc, char** argv )
{
    IplImage* pImg; //声明IplImage指针
    //载入图像
    if( argc == 2 &&
        (pImg = cvLoadImage( argv[1], 1)) != 0 )
    {
        cvNamedWindow( "Image", 1 );//创建窗口
        cvShowImage( "Image", pImg );//显示图像
```





第一个小例子

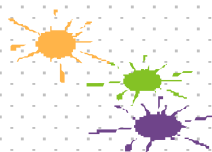
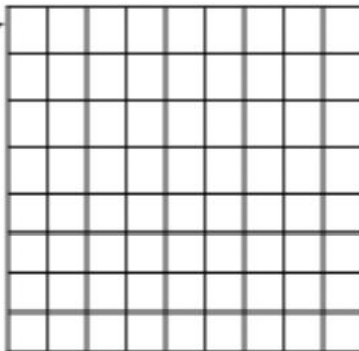
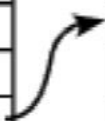
```
cvWaitKey(0); //等待按键  
cvDestroyWindow( "Image"  
); //销毁窗口  
cvReleaseImage( &pImg ); //  
释放图像  
return 0;  
}  
return -1;  
}
```



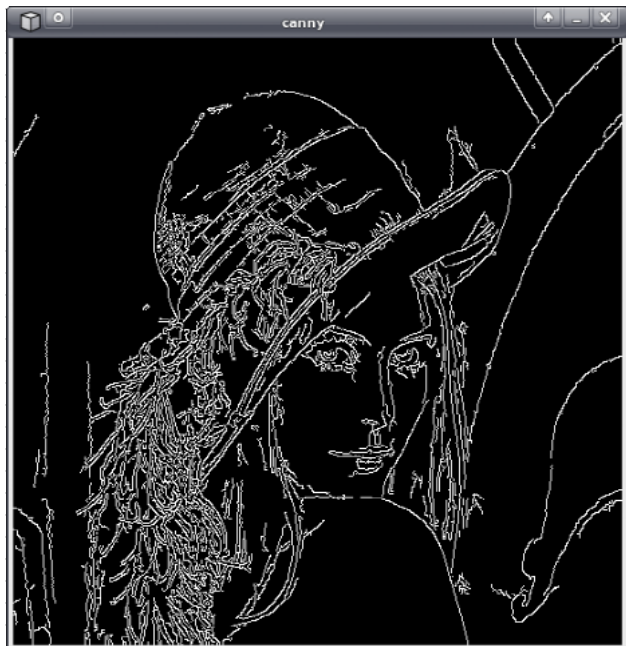
IplImage/CvMat

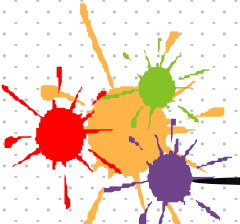
- 图像：二维（单通道）或者三维（多通道）的矩阵。

	...
int	nChannels
int	depth
int	width
int	height
char*	imageData
	...



边缘检测



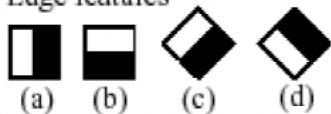


人脸检测

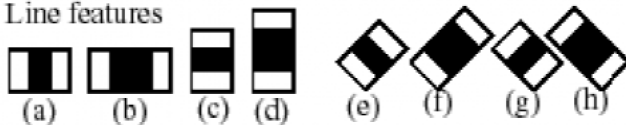


Images from Yale Face database

1. Edge features



2. Line features



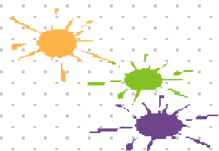
3. Center-surround features



Haar Features

+

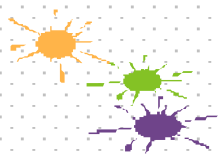
Adaboost

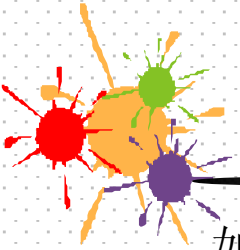




人脸检测

```
CvSeq* cvHaarDetectObjects( const CvArr* image,  
                             CvHaarClassifierCascade* cascade,  
                             CvMemStorage* storage,  
                             double scale_factor=1.1,  
                             int min_neighbors=3, int flags=0,  
                             CvSize min_size=cvSize(0,0) );
```





双目视觉

如何从左图和右图求出深度信息?



Images from the Middlebury College






双目视觉

Block matching

```
void cvFindStereoCorrespondenceBM(  
    const CvArr* left,  const CvArr* right,  
    CvArr* disparity, CvStereoBMState* state );
```

Graph cut

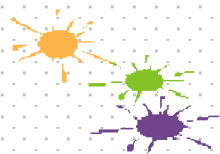
```
void cvFindStereoCorrespondenceGC(  
    const CvArr* left, const CvArr* right,  
    CvArr* dispLeft, CvArr* dispRight,  
    CvStereoGCState* state,  
    int useDisparityGuess CV_DEFAULT(0) );
```





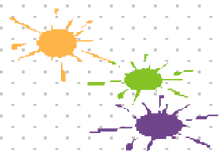
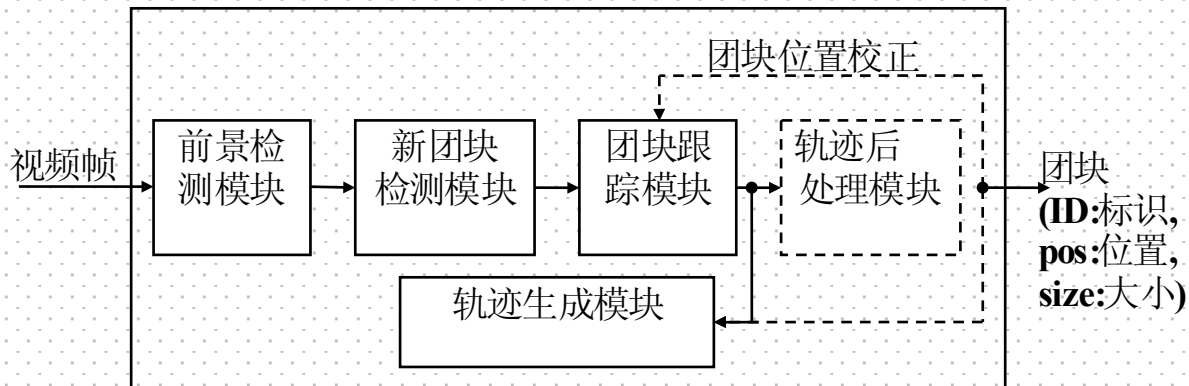
运动物体跟踪

- **MeanShift**
- **CamShift**



运动物体跟踪

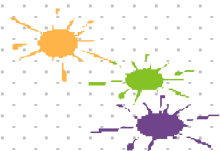
■ Blob Track





EMCV

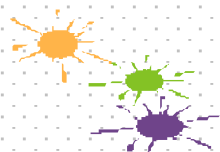
- **EMCV** 全称为**Embedded Computer Vision Library**，是一个可在**TI DM64x**系列**DSP**上运行的计算机视觉库。**EMCV**提供了跟**OpenCV**完全一致的函数接口，通过**EMCV**，你可以轻松的将你的**OpenCV**算法移植到**DSP**，甚至不用改一行代码。
- **EMCV**项目主页：<http://sf.net/projects/emcv>





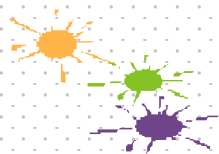
EMCV

- 目前EMCV已经支持IplImage, CvMat, CvSeq等基本数据结构,
- 可使用cvCreateImage等创建和释放图像, 以及contour检测等。
- 欢迎大家参与!



演示

- 运动物体跟踪
- 台风天气下跟踪
- 夜晚跟踪
- 主动跟踪
- 人脸识别



参考资料

- OpenCV中文网站 <http://www.opencv.org.cn>

