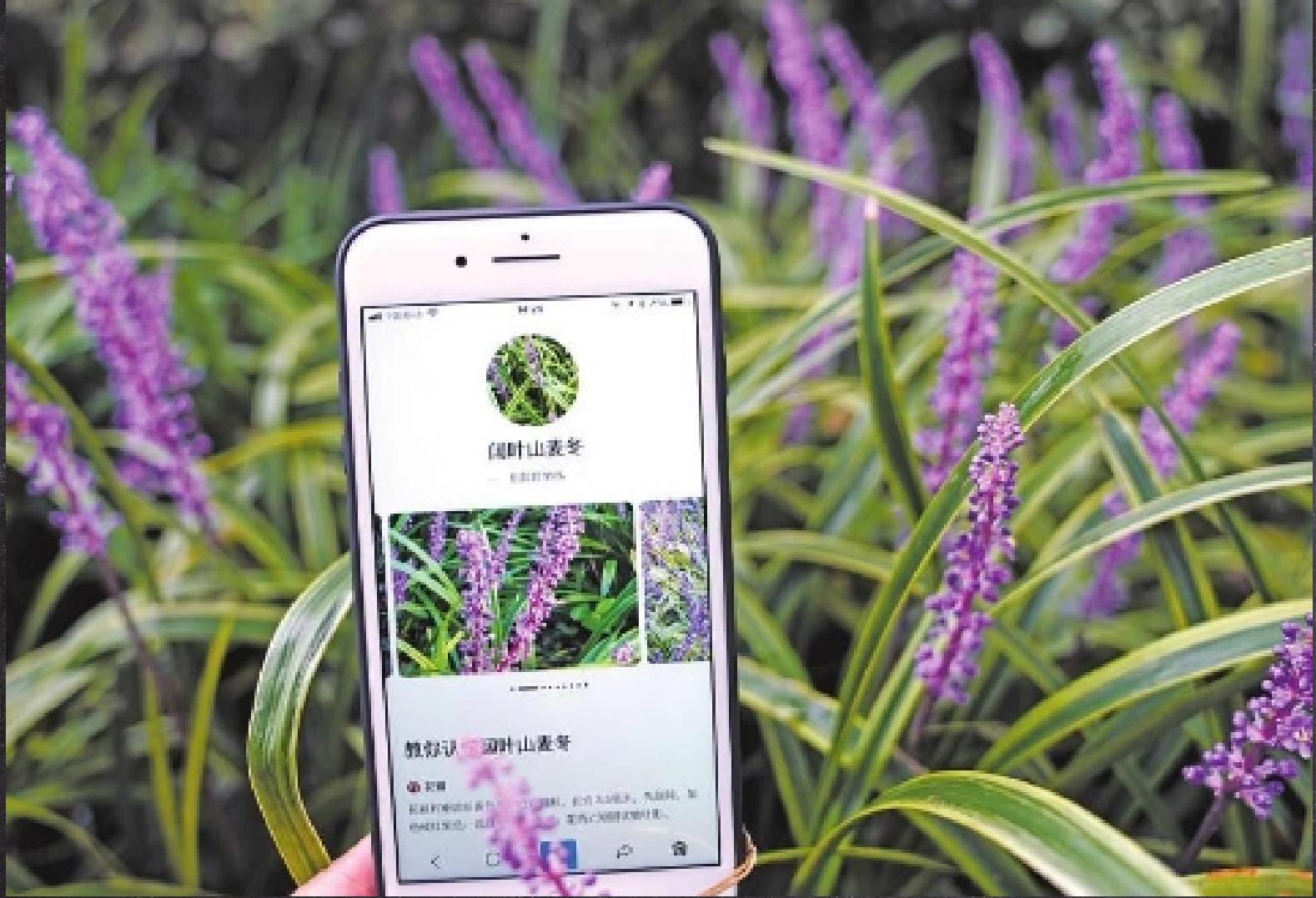


计算视觉与模式识别

视觉

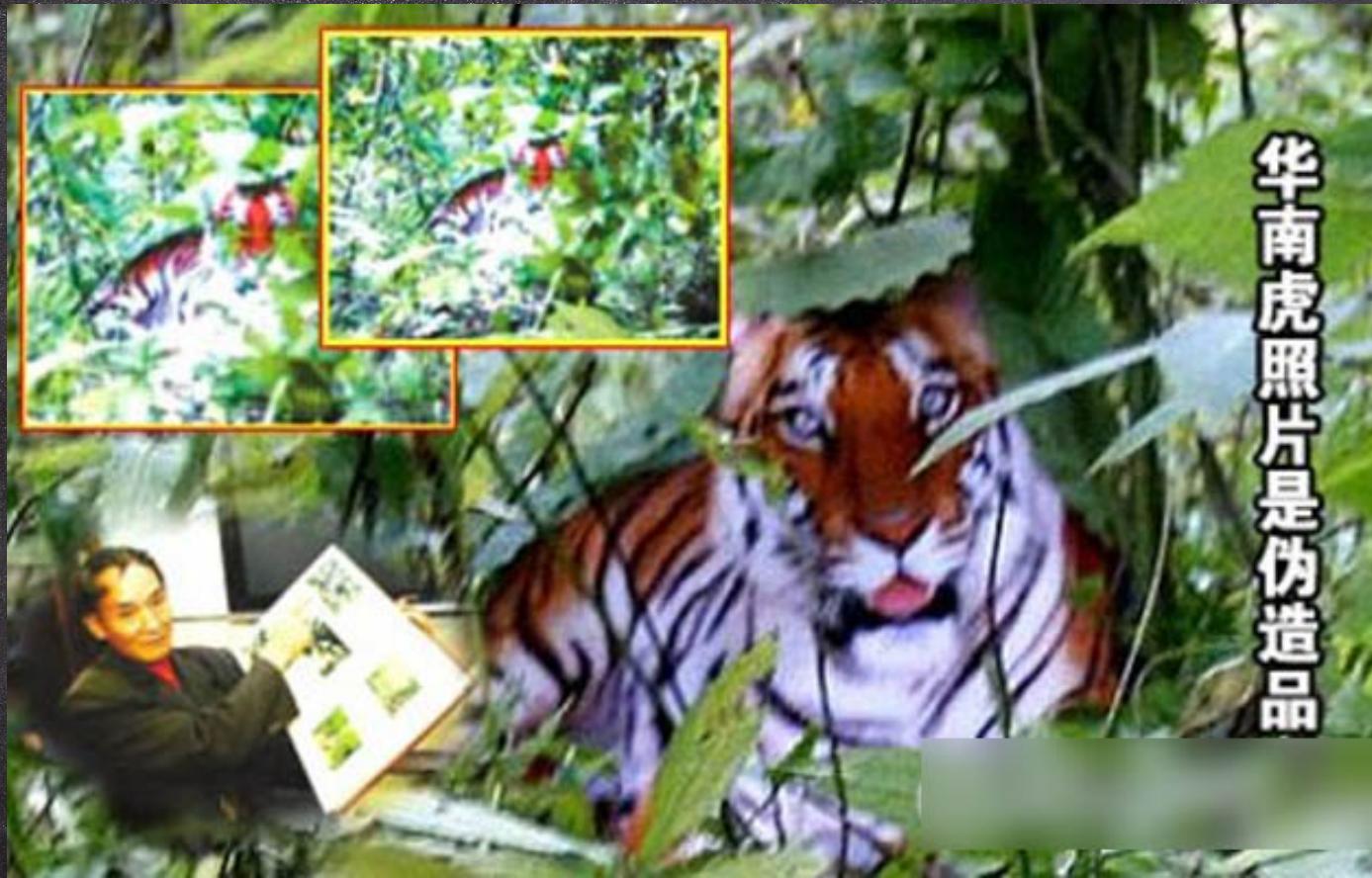


百闻不如一见

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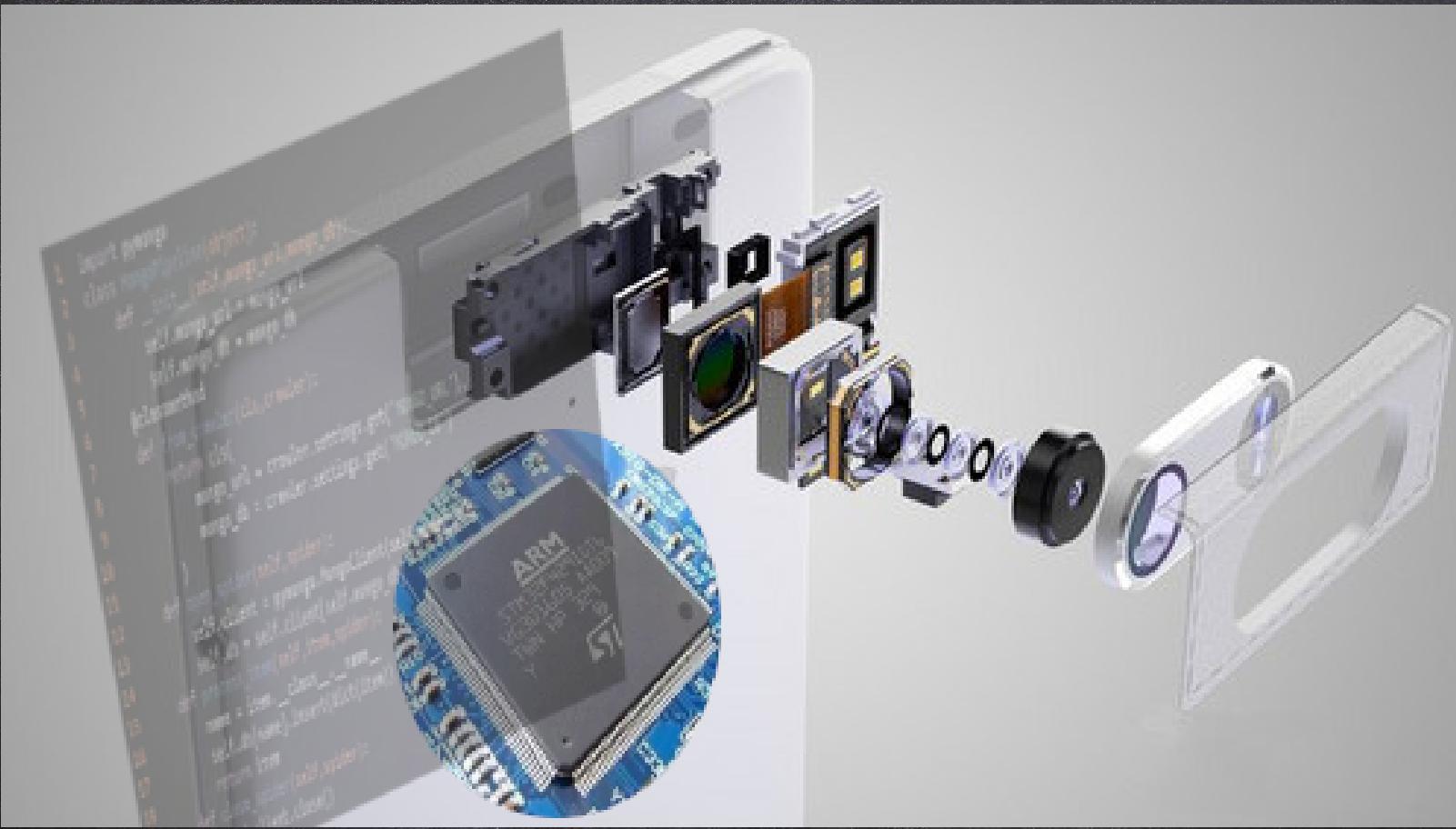
耳听为虚，眼见为实？



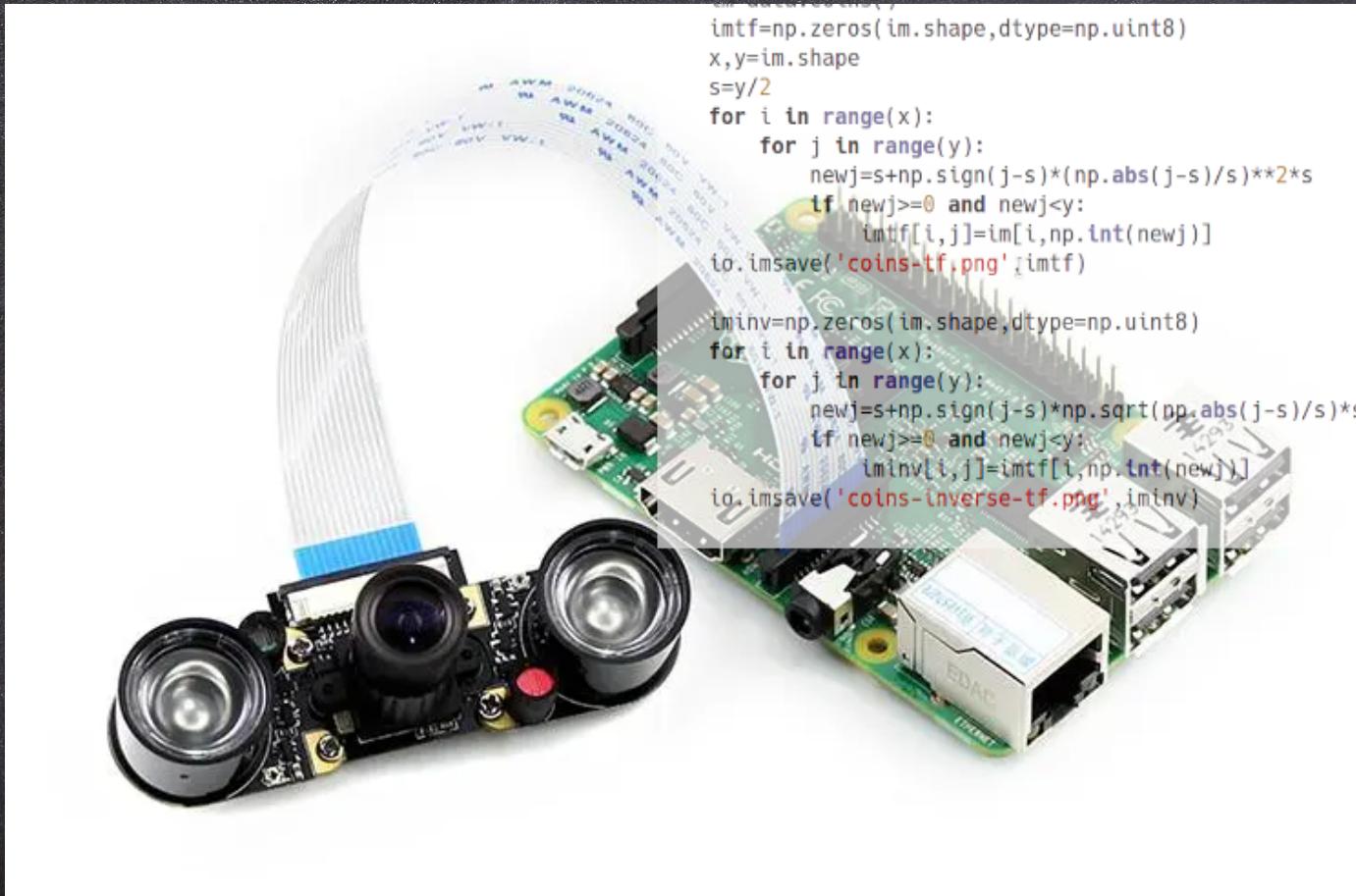
<https://iask.sina.com.cn/d-b/554b06f3e4b0d8ec5b976531-7.html>

视觉系统

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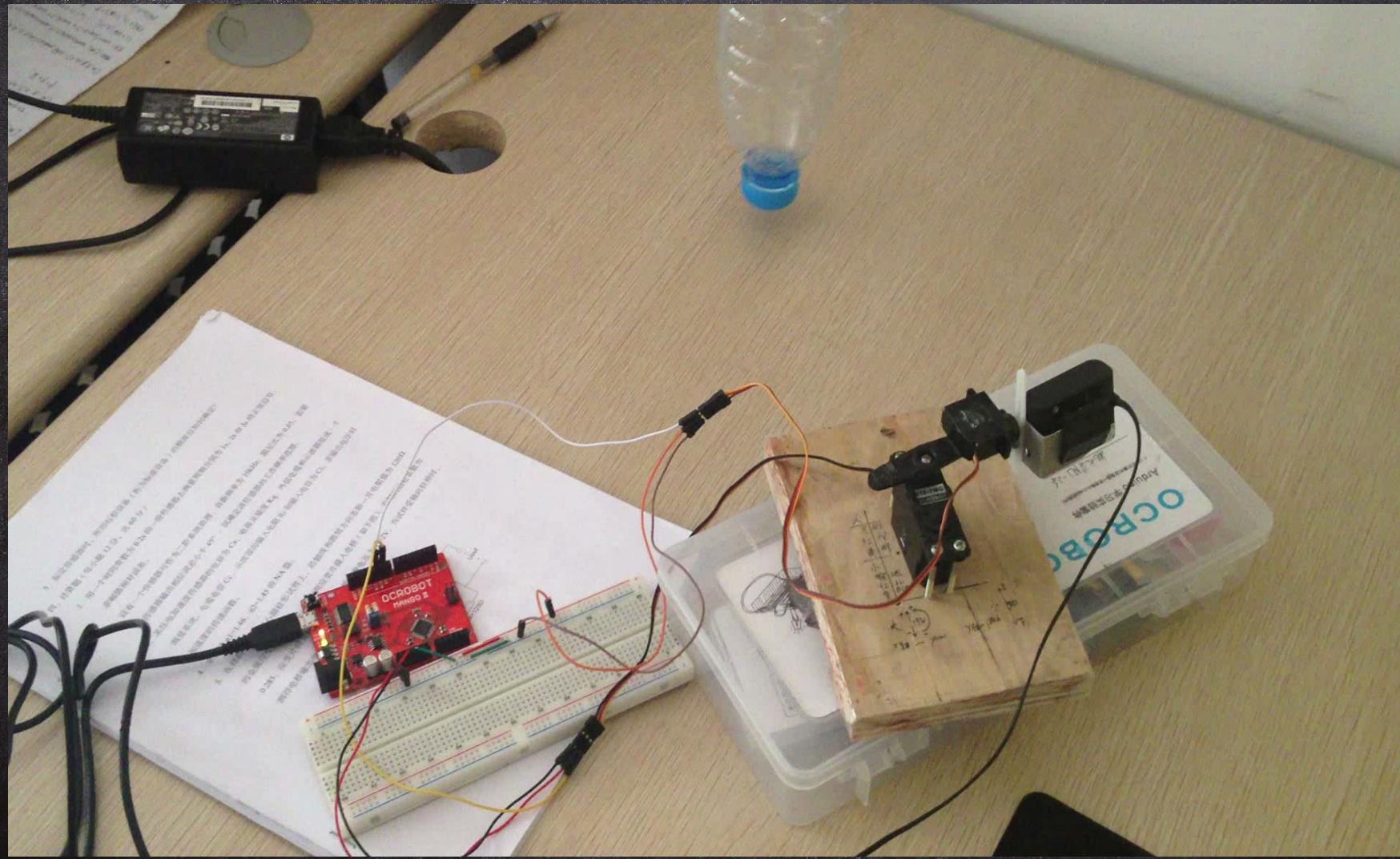


视觉系统



开发示例

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硬件

USB转串口线

PWM信号



PC连接开发板与摄像头

USB摄像头连线

其他连线说明：

水平舵机：

黑色接地

红色接5v电源

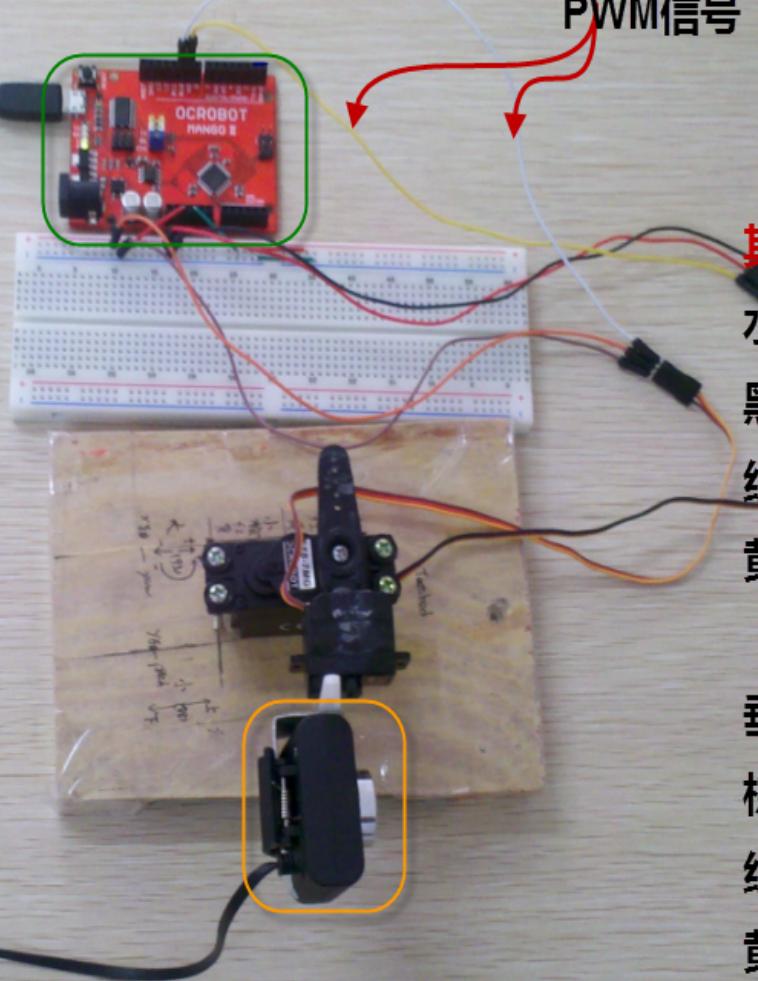
黄色接PWM#9

垂直舵机：

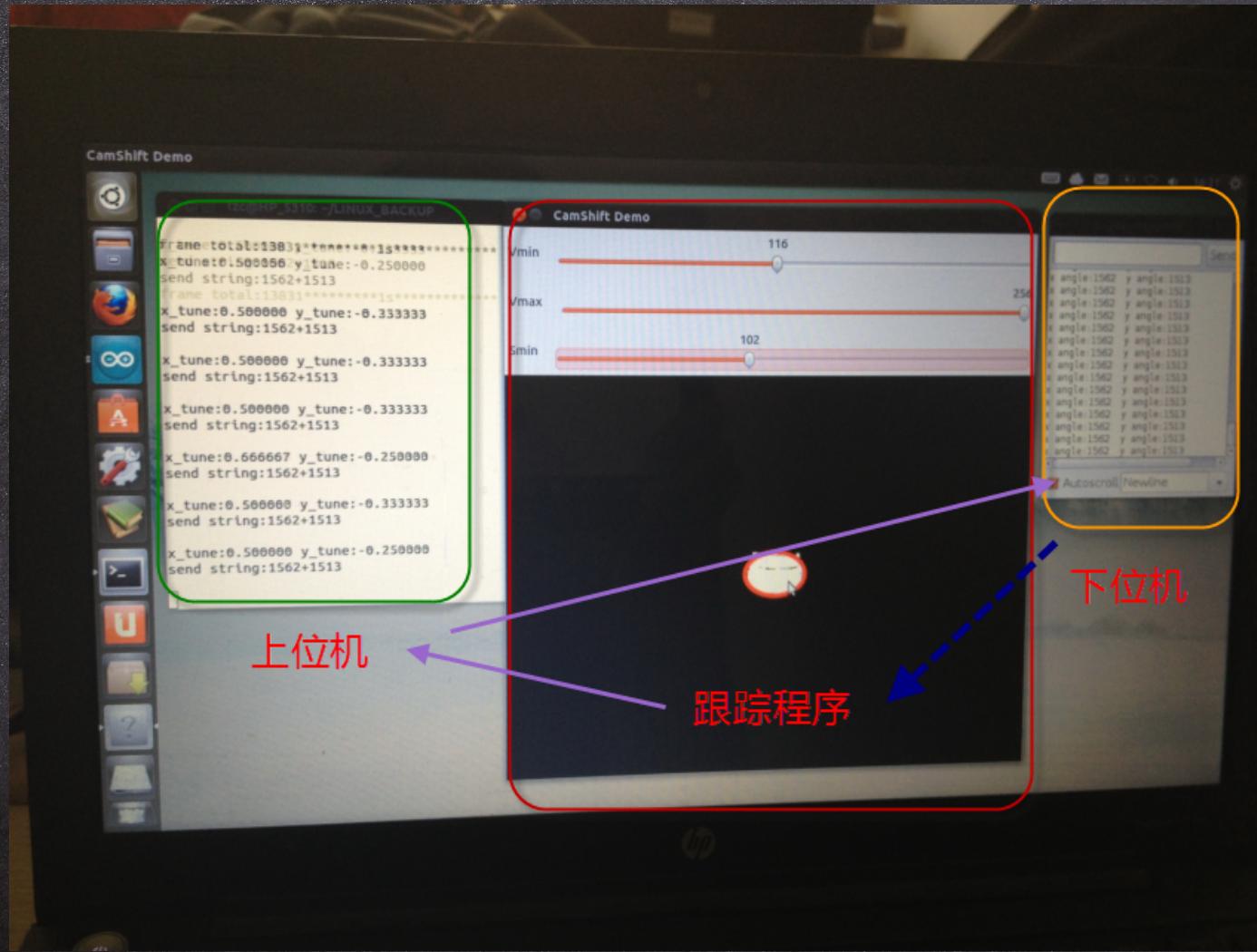
棕色接地

红色接5V电源

黄色接PWM#10

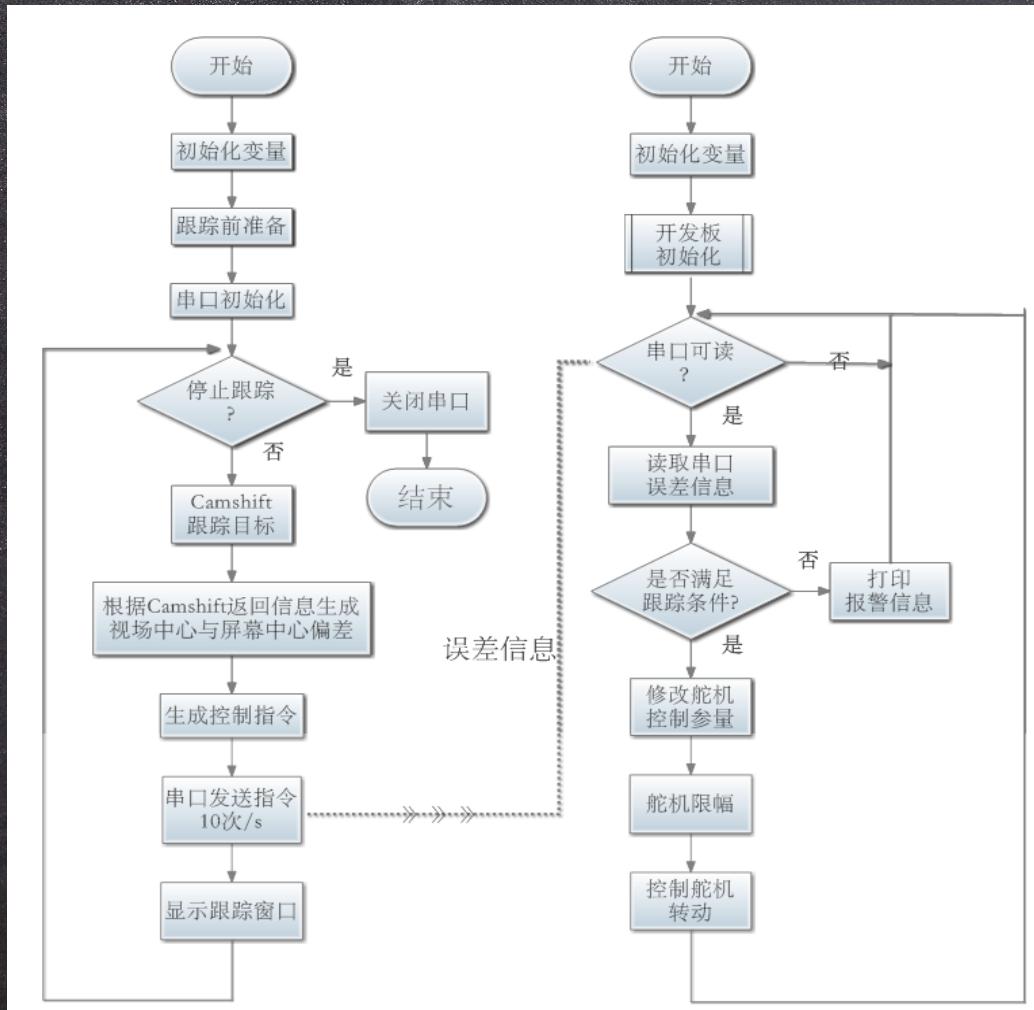


软件



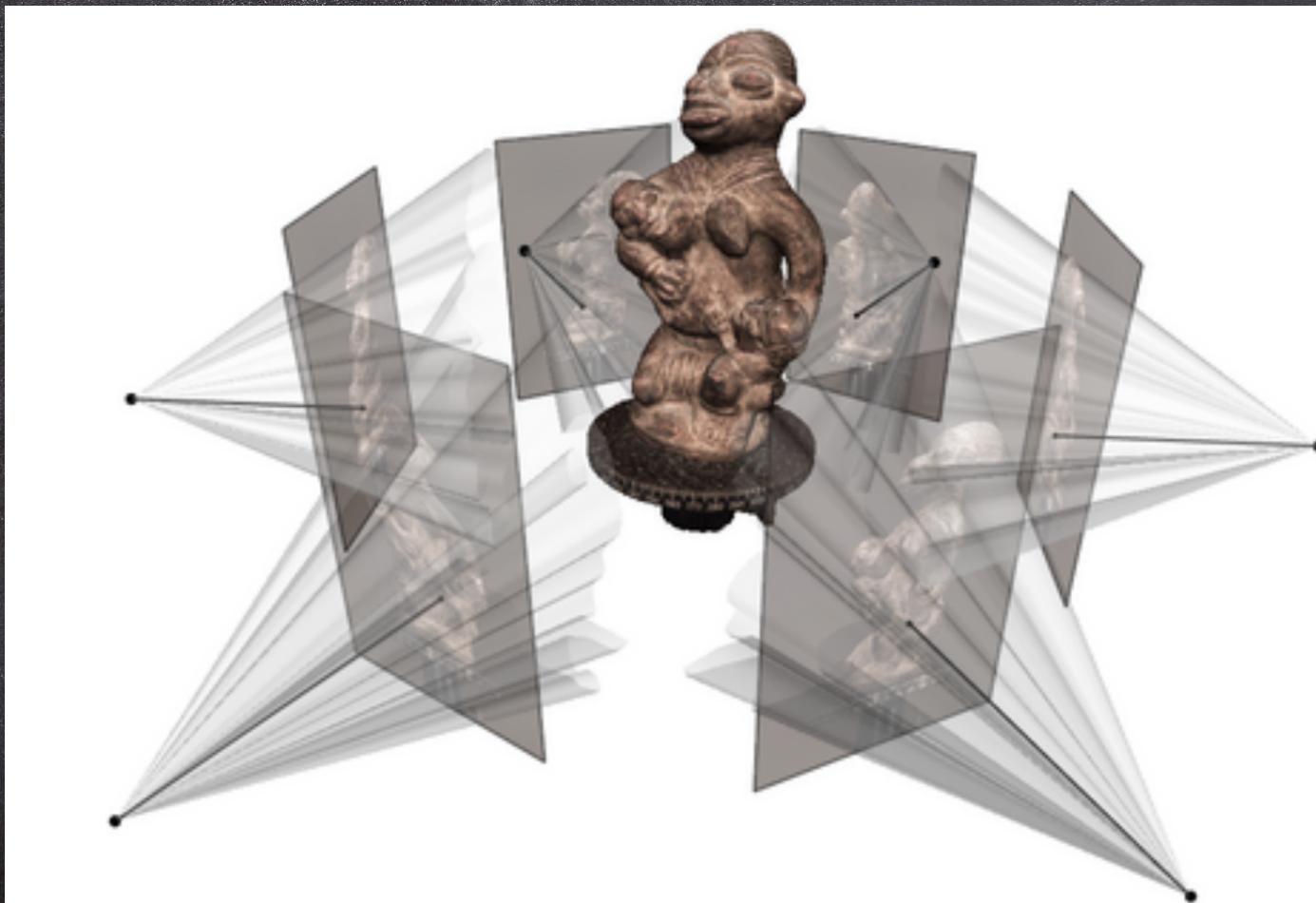
流程图

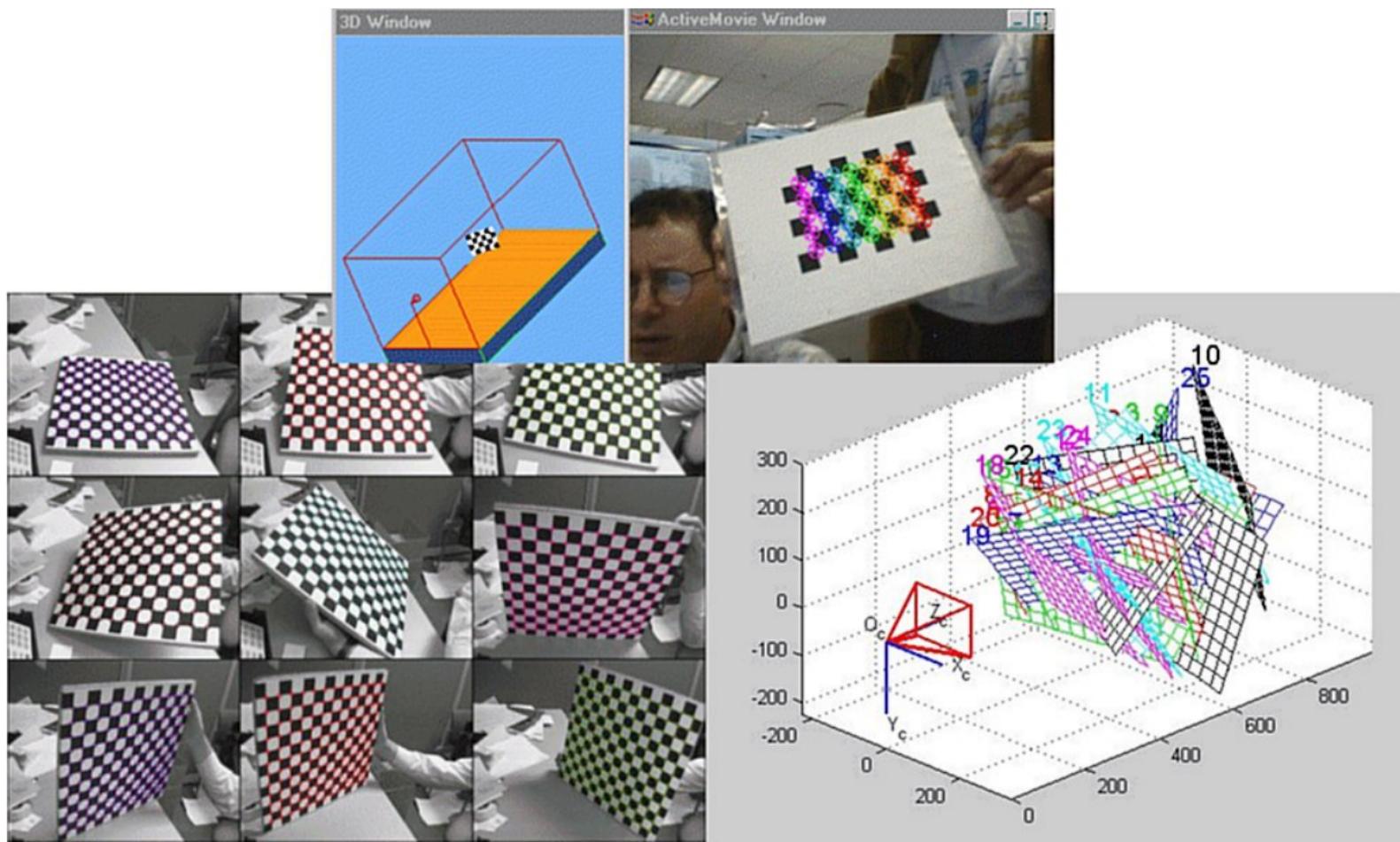
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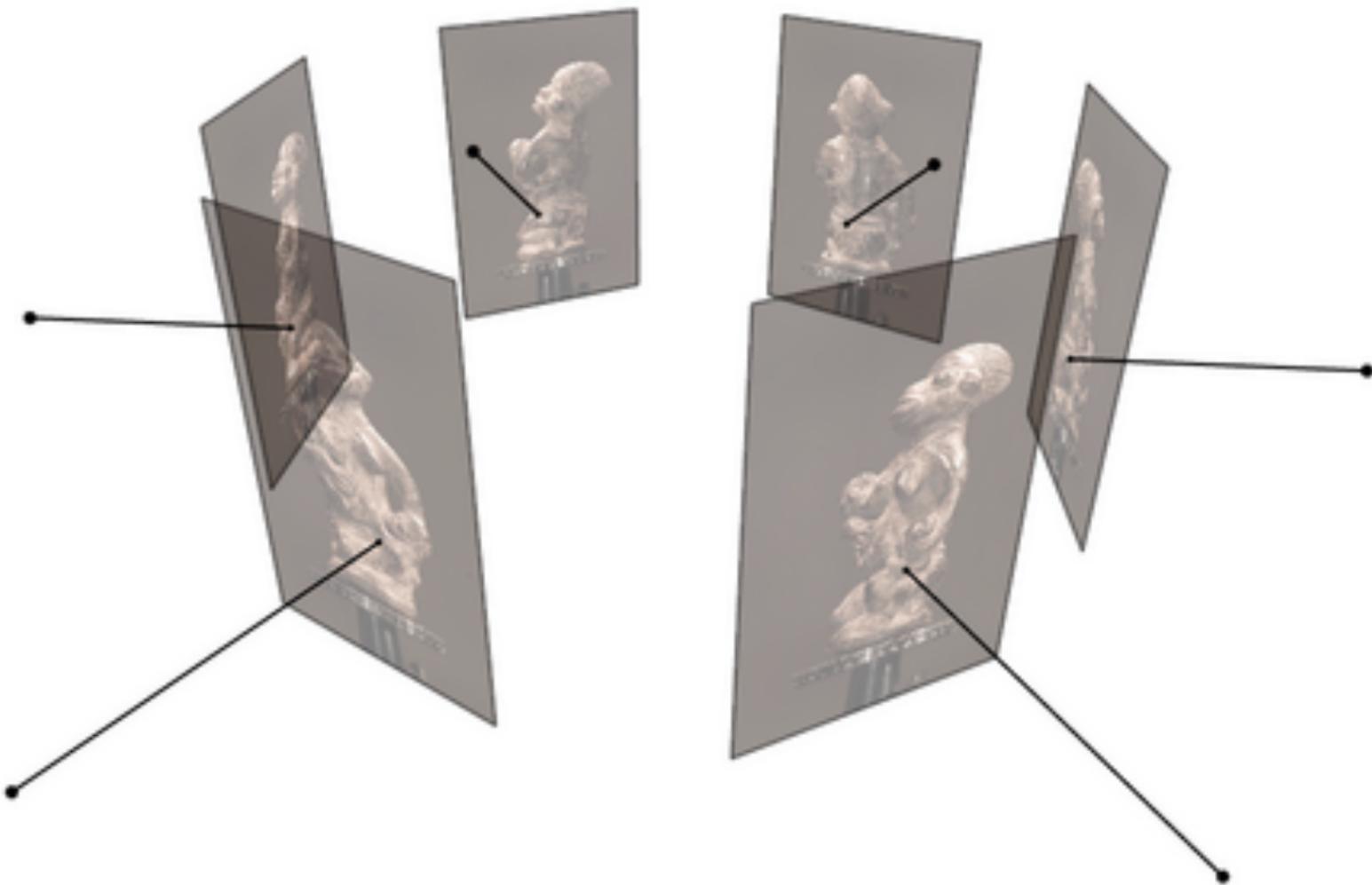


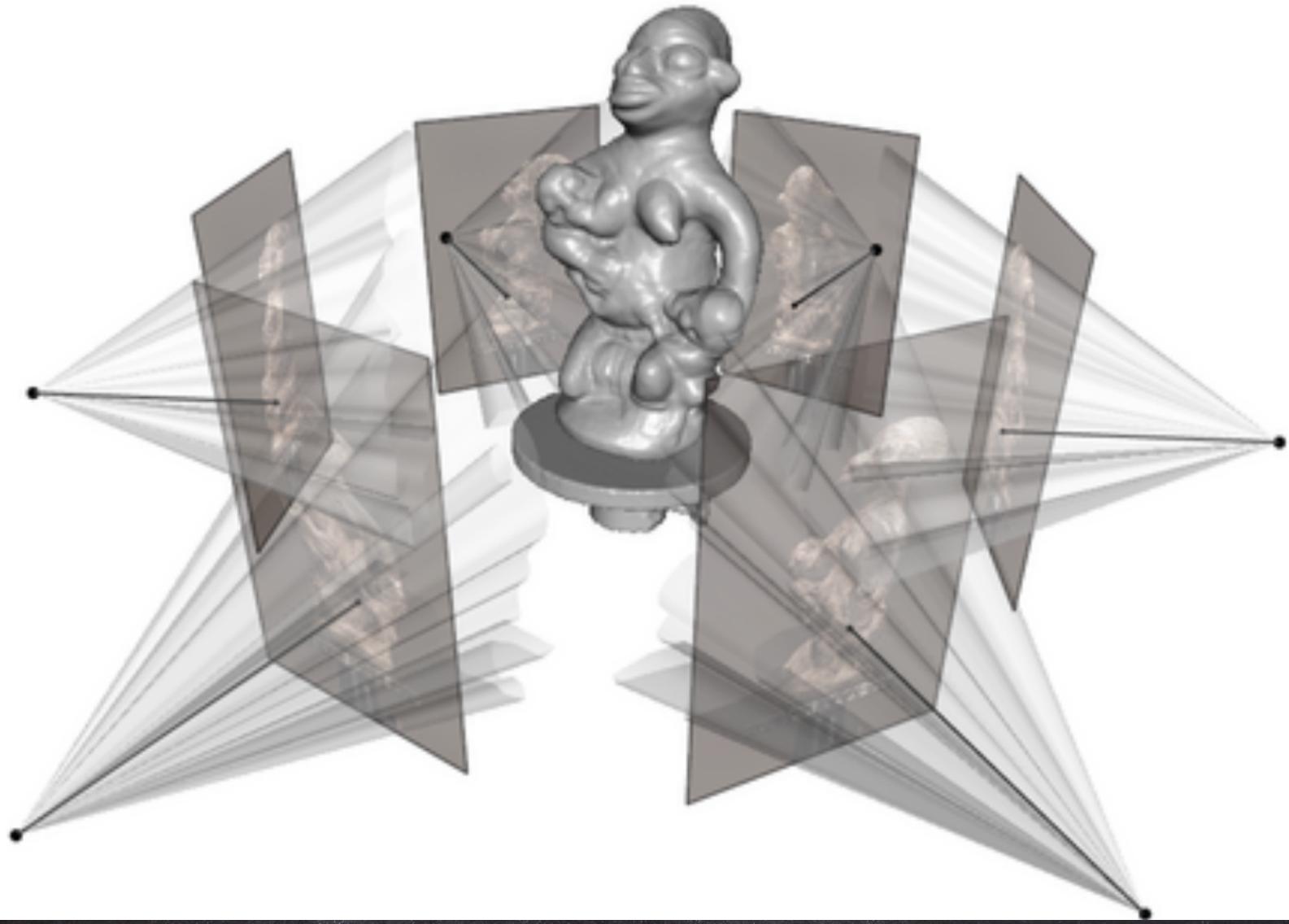
应用示例——三维重建

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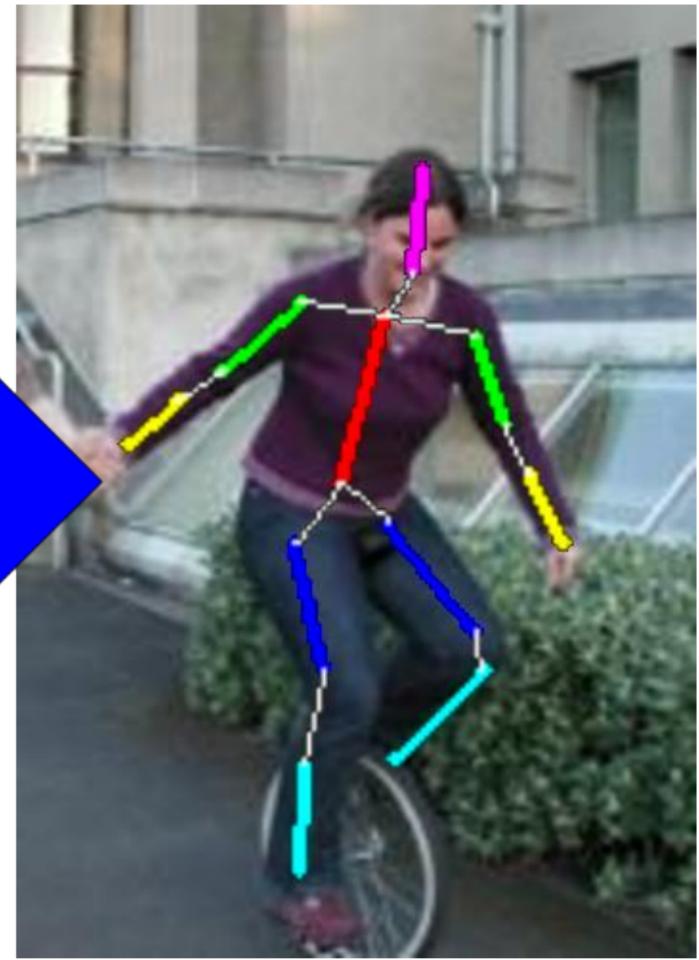
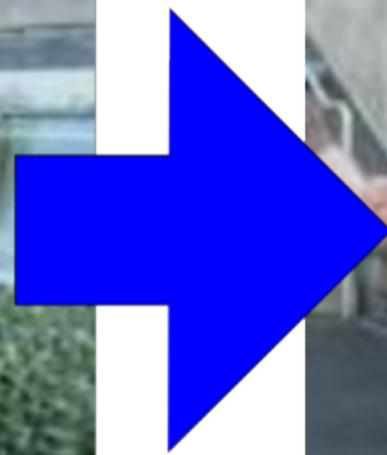






应用示例——姿态估计

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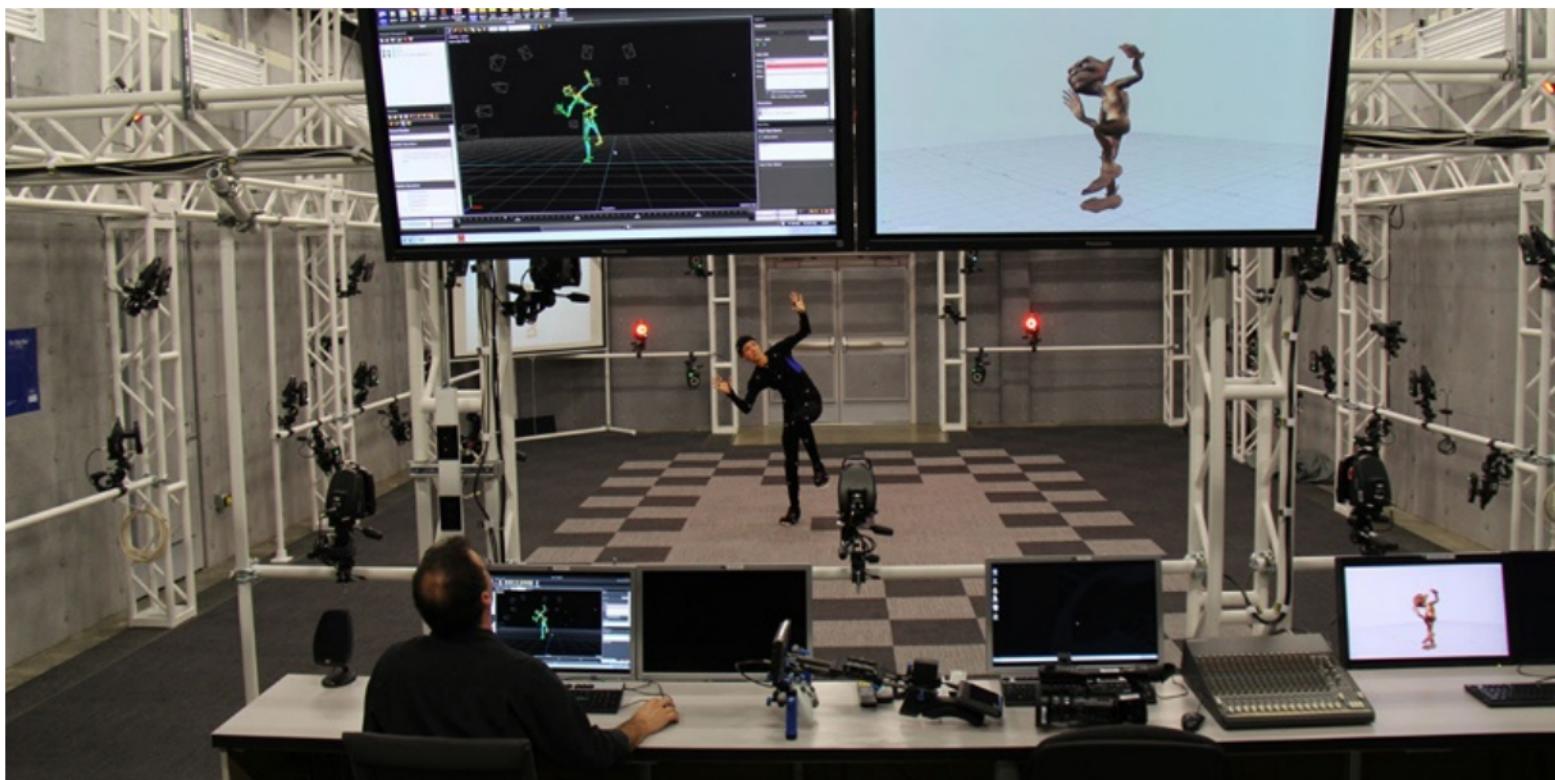
模糊恢复

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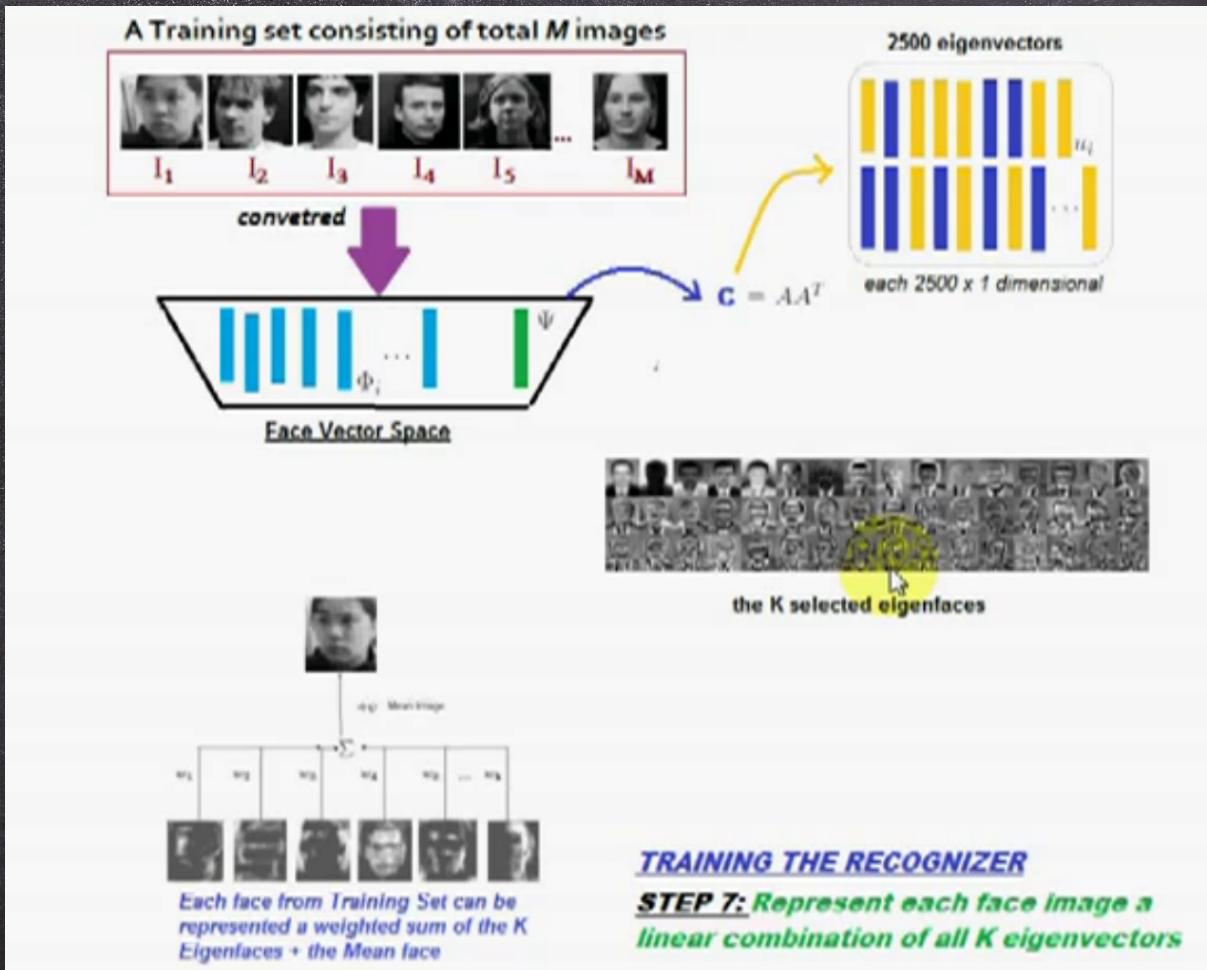
运动分析

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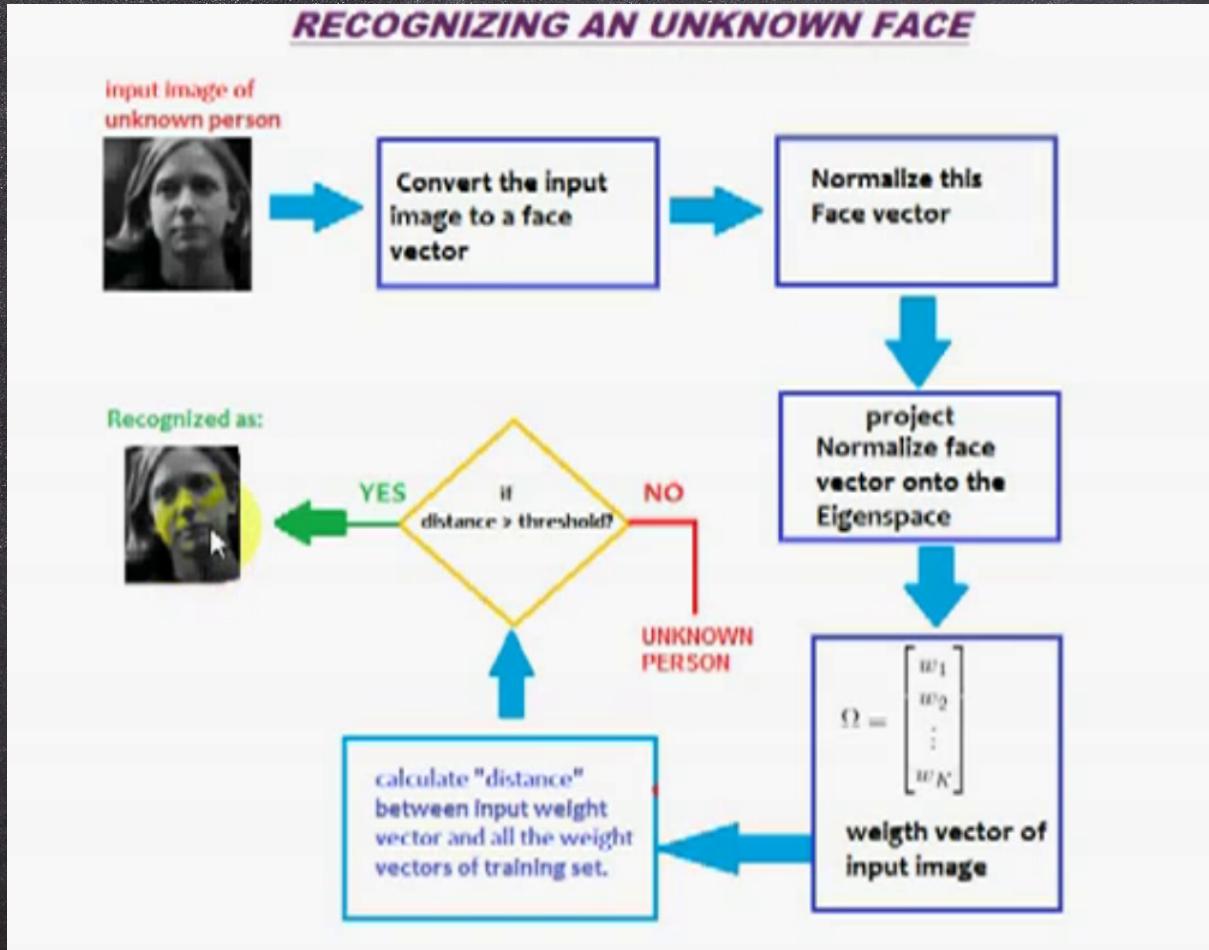
应用示例——人脸识别（训练）





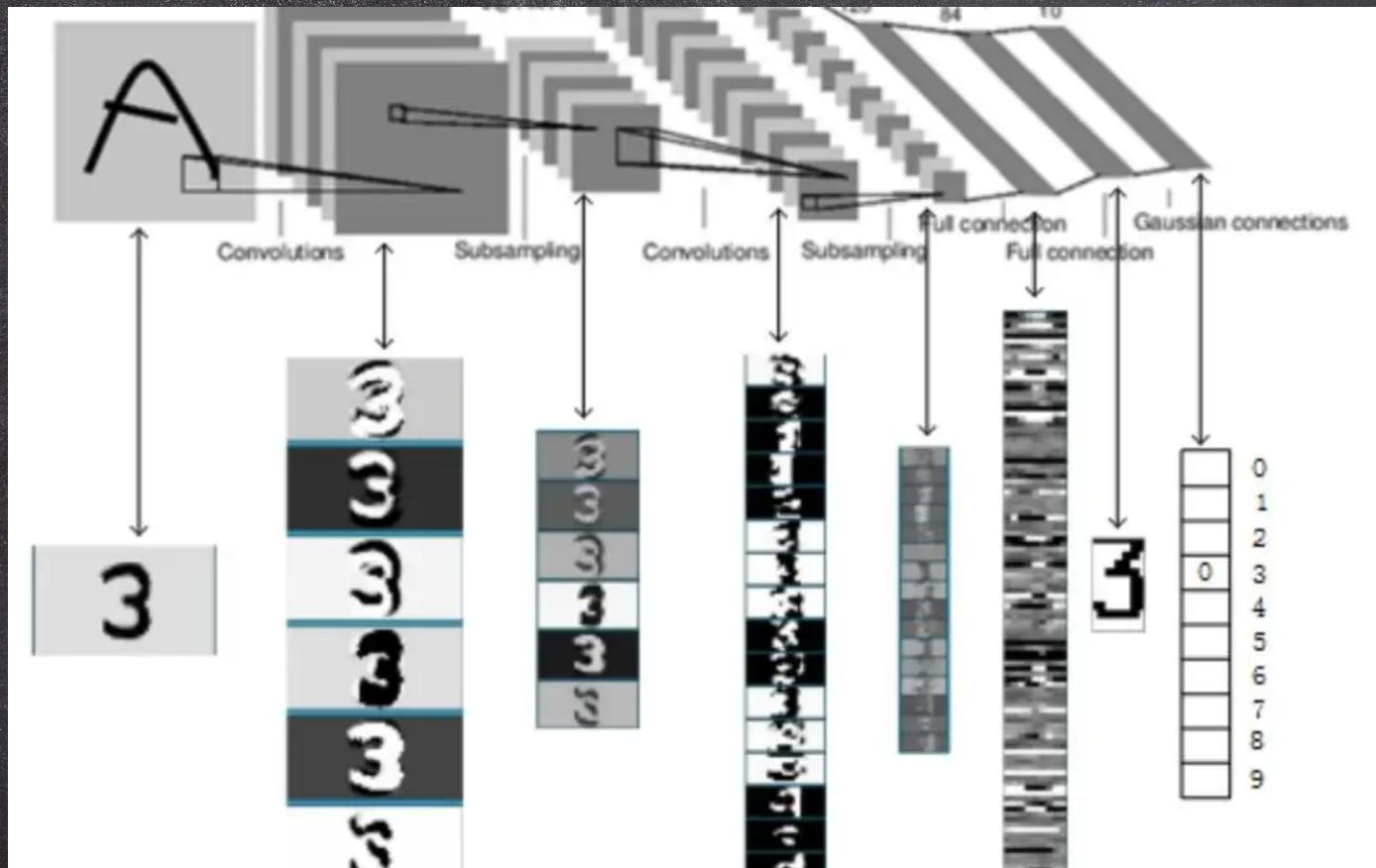
应用示例——人脸识别（测试）

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手写识别

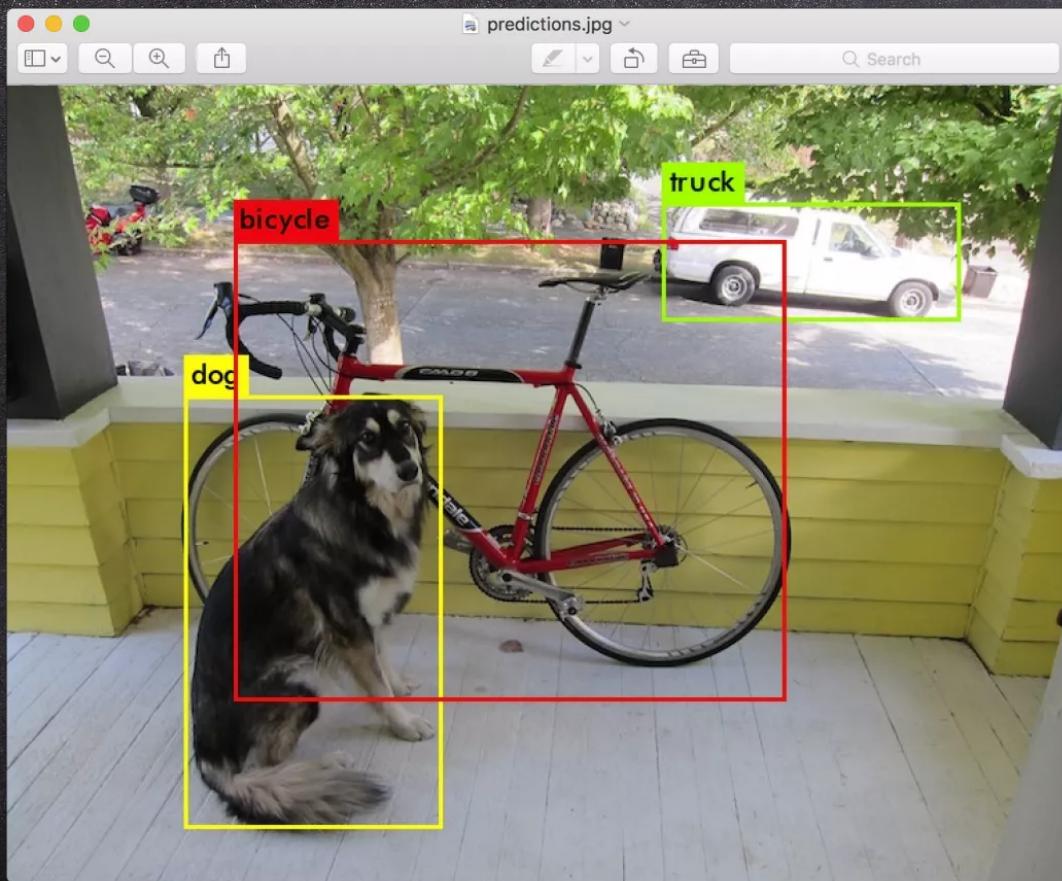
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应用示例——分割

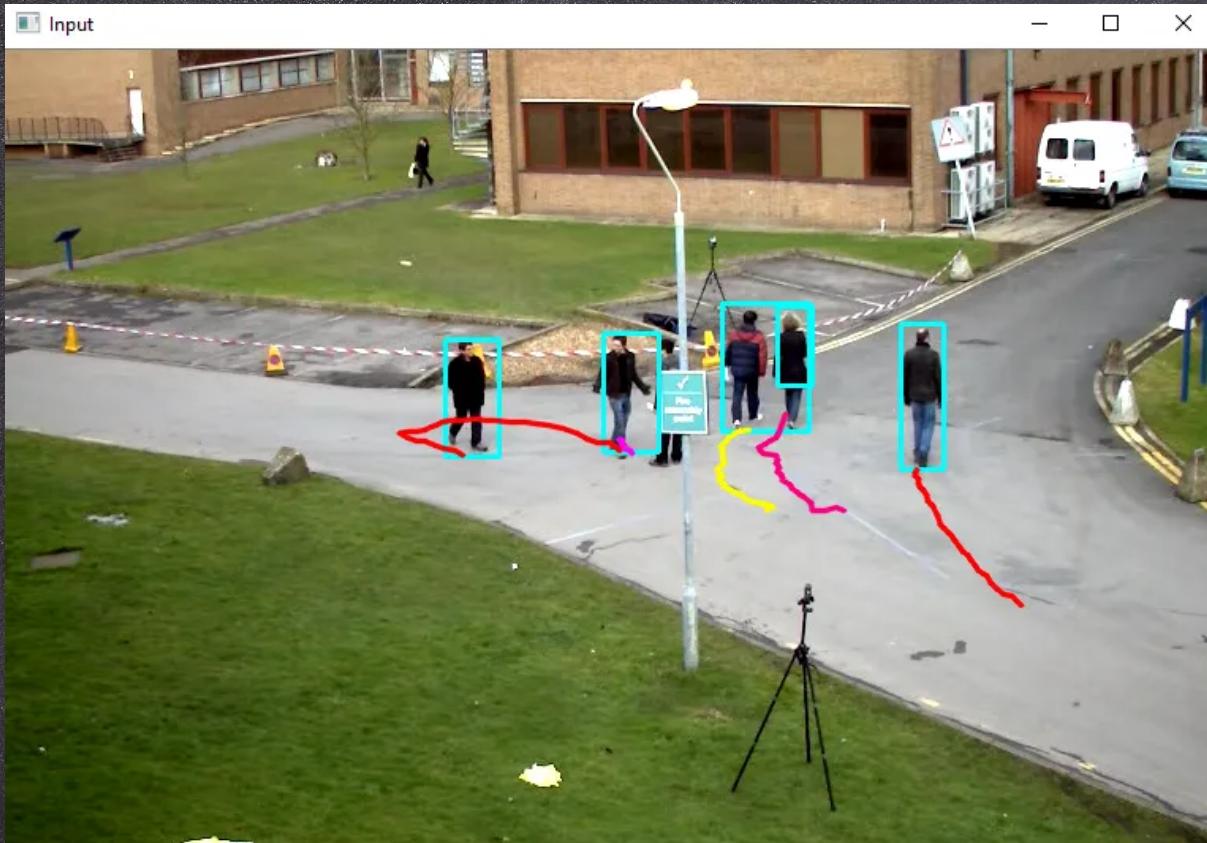


应用示例——目标检测



应用示例——目标跟踪

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视觉主要功能在于：

从视网膜成像的二维图像来恢复空间物体的可见三维表面形状”，

即“三维重建”（3D reconstruction）。

- 计算理论

挖掘关于成像物理场景的内在属性来完成相应的视觉问题计算

- 表达和算法

物体的表达形式为该物体的三维几何形状。

- 算法实现

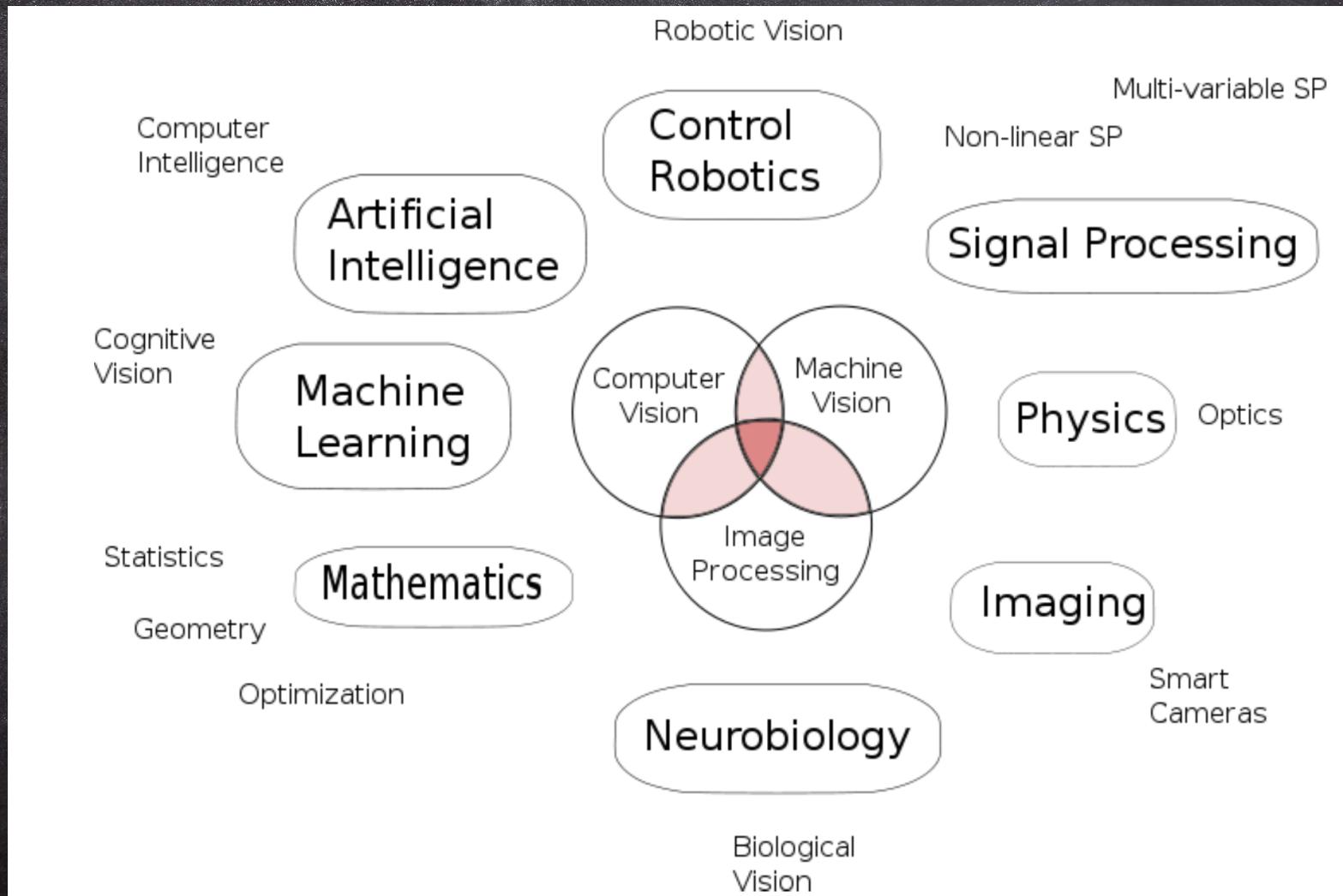
大脑的神经计算和计算机的数值计算没有本质区别

表达和算法

从图像到三维表达，要经过三个计算层次：

1. 从图像得到一些基元（primal sketch），
2. 通过立体视觉（stereopsis）等模块将基元提升到2.5维表达，
3. 提升到三维表达。

相关学科



- 摄像机模型
- 图像特征提取
- 图像配准与拼接
- 立体视觉
- 模式识别基础
- 图像目标识别
- 运动分析

- <https://www.coursera.org/learn/digital>
Fundamentals of Digital Image and Video Processing(coursera)
- <https://www.coursera.org/learn/image-processing>
Image and Video Processing: From Mars to Hollywood with a Stop at the Hospital(coursera)
- <https://www.coursera.org/learn/computer-vision-basics>
Computer Vision Basics University at Buffalo

- <https://github.com/kmario23/deep-learning-drizzle>
 - <https://vision.in.tum.de/teaching/ws2016/vmcv2016>
 - <https://web.eecs.umich.edu/~justincj/teaching/eecs498/WI2022/>
 - <https://www.crcv.ucf.edu/courses/cap5415-fall-2020/material-cap5415-fall-2020/>

- 计算机视觉——一种现代方法
- Python计算机视觉编程
- 数字图像处理（冈萨雷斯）
- 计算机视觉：算法与应用
- Pattern Recognition and Machine Learning

- Python+++
- Matlab/Octave++
- Julia
- R
- C++
- Java

- <https://www.kaggle.com/> 数据科学竞赛平台、社区
- [https://learnxinyminutes.com \](https://learnxinyminutes.com/) 各种程序设计语言快速入门
- <https://mirrors.tuna.tsinghua.edu.cn/> 清华镜像
- <https://mirrors.ustc.edu.cn/> 中科大镜像

- <http://dlib.net/> machine learning C++ toolkit
- <https://opencv.org/> computer vision toolkit
- <https://keras.io/> neural network toolkit
- <https://tensorflow.google.cn/> machine learning toolkit
- <https://scikit-image.org/> image processing in python
- <https://pytorch.org/> machine learning toolkit
- <https://www.cimg.eu/> c++ template image processing library

- GIMP(GNU Image Manipulation Program):

<http://www.gimp.org>

- ImageMagick:

<http://wwwimagemagick.org>

- ImageJ:

<https://imagej.nih.gov/ij/>

- VLFEET:

<http://www.vlfeat.org>