

# **Lab 02. Image filtering and transform**

Introduction to Computer vision, lab 02.

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- Gaussian filtering
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# Gaussian filtering



# Median filtering





# Bilateral filtering



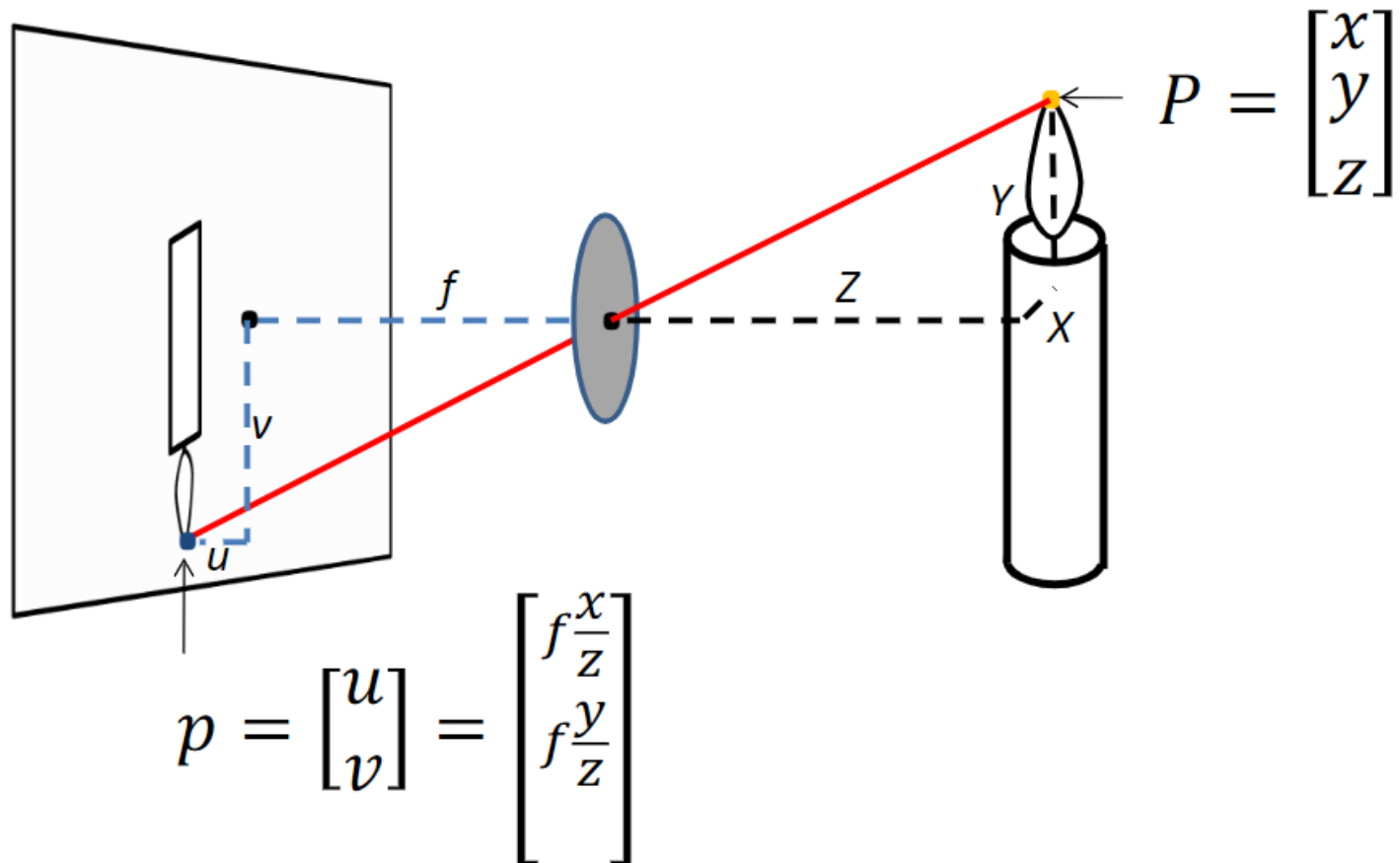
# Image filtering

- 边缘处理 `aaa|abcde|eee`
- 不可以直接调用作业对应的opencv filter函数(GaussianBlur等), 可以调用cv2的辅助函数(cv2.filter2D等)
- 其他参数与opencv-python要求一致

[https://docs.opencv.org/4.5.3/d4/d86/group\\_imgproc\\_filter.html](https://docs.opencv.org/4.5.3/d4/d86/group_imgproc_filter.html)

# Perspective projection

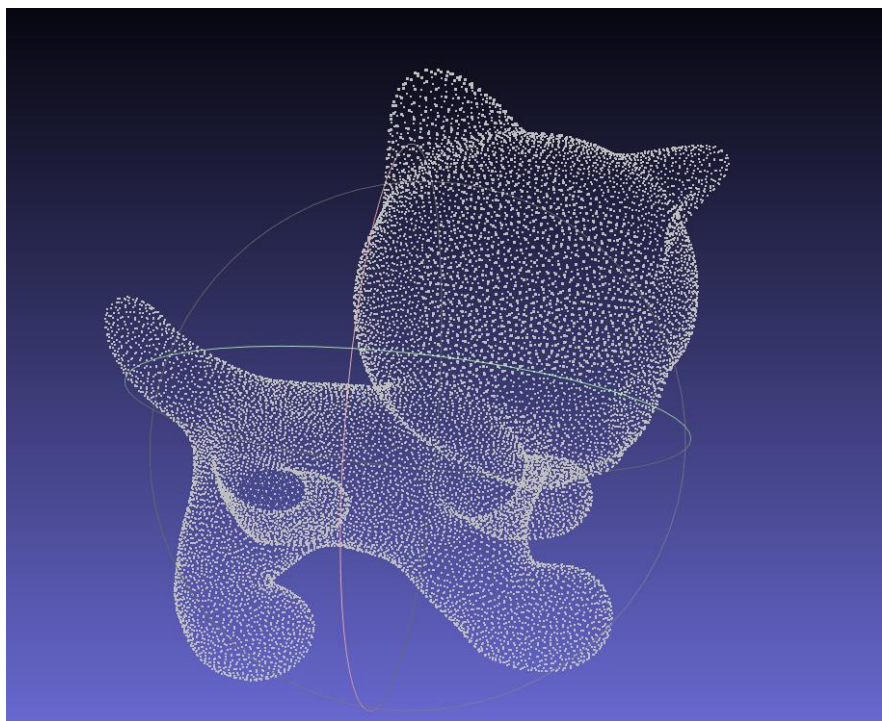
- 3D world coordinates  $\rightarrow$  2D image coordinates



# Perspective projection

输入: 点云模型, 焦距 ( $f_x, f_y$ )

输出: UV坐标, 使用matplotlib.pyplot以散点图的形式绘制在2D平面上。





# 使用矩阵运算完成作业

- Projection is a matrix multiplication using homogeneous coordinates

$$\begin{bmatrix} f & 0 & 0 & 0 \\ 0 & f & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} = \begin{bmatrix} fx \\ fy \\ z \end{bmatrix} \cong \begin{bmatrix} f\frac{x}{z} \\ f\frac{y}{z} \\ 1 \end{bmatrix}$$