Quiz 1
Computer Vision
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Select (one or many) correct answer for the following questions:

1- Camera calibration means :
   a- Calculate the intrinsic and extrinsic parameters of the camera
   b- Calculate the intrinsic parameters
   c- Find the transformation 2D <-> 3D
   d- Calculate the orientation of the camera with respect to the world coordinates.

2- In the camera calibration process :
   a- We need to know the 3D coordinates of scene points with respect to the camera frame
   b- We need to know the 3D coordinates of scene points with respect to the world frame
   c- The coordinates of image points are sufficient
   d- We need to know in addition to the 3D coordinates of scene points with respect to the camera frame, the coordinates of their projection on the image plane.

3- In the camera calibration process :
   a- We need to know the orientation and relative position of the camera coordinate frame with respect to the world coordinate frame.
   b- We need to know the orientation and relative position of the world coordinate frame with respect to the camera coordinate frame.
   c- We need to know only the orientation of the world coordinate frame with respect to the camera coordinate frame.
   d- There is no need to know anything.

4- The internal parameters of the camera are:
   a- The pixel densities (pixels/mm): m_x, m_y
   b- The coordinates of the principle point (O_x, O_y)
   c- The focal length and pixel densities (pixels/mm): m_x, m_y
   d- The focal length and pixel densities (pixels/mm): m_x, m_y and the coordinates of the principle point (O_x, O_y)
   e- f_x, f_y and the coordinates of the principle point (O_x, O_y)

5- In the writing of calibration camera equations, homogenous coordinates are used in order to:
   a- Get a linear system of equations
   b- Be able to express linearly the orientation and relative position of the world coordinate frame with respect to the camera coordinates frame.
   c- Be able to express linearly the orientation and relative position of the camera coordinate frame with respect to the world coordinates frame.

6- What does mean the following equation:

$$\tilde{P}_c = \begin{bmatrix} x_c \\ y_c \\ z_c \\ 1 \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & r_{13} & t_x \\ r_{21} & r_{22} & r_{23} & t_y \\ r_{31} & r_{32} & r_{33} & t_z \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_w \\ y_w \\ z_w \\ 1 \end{bmatrix}$$

   a- The scene point Pc (xc,yc,zc) is written with respect to the world coordinate frame.
   b- The scene point Pw (xw,yw,zw) is written with respect to the camera coordinate frame.
   c- This is a writing of the coordinate of Pw with respect to the camera coordinate frame using the rotation (rij) and translation (tx,ty,tz).
   d- It gives the position of the camera with respect to the world coordinate frame.

7- What does mean the following equation:

$$\begin{bmatrix} u \\ v \\ 1 \end{bmatrix} \equiv \begin{bmatrix} \tilde{u} \\ \tilde{v} \\ \tilde{w} \end{bmatrix} = \begin{bmatrix} f_x & 0 & O_x & 0 \\ 0 & f_y & O_y & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_c \\ y_c \\ z_c \\ 1 \end{bmatrix}$$

   a- The image point (u,v) is written with respect to the camera coordinate frame.
   b- The image point (u,v) is written using the intrinsic calibration matrix and the coordinates of the scene point with respect to the camera coordinate frame.
   c- The image point (u,v) is written using the extrinsic calibration matrix and the coordinates of the scene point with respect to the camera coordinate frame.
   d- It gives the image formation model.

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8- The projection matrix P is calculated using:

$$P = \begin{bmatrix} P_{11} & P_{12} & P_{13} & P_{14} \\ P_{21} & P_{22} & P_{23} & P_{24} \\ P_{31} & P_{32} & P_{33} & P_{34} \end{bmatrix}$$

    a- The addition of the intrinsic and extrinsic matrices
    b- The product of the intrinsic and extrinsic matrices ,
    c- Only with the image points.

9- To calibrate a camera:
    a- We need at least the 3D coordinates of 8 scene points and their images.
    b- We need no more than the 3D coordinates of 4 scene points and their images.
    c- We need at least the 3D coordinates of 6 scene points and their images.

10- Camera calibration needs:
    a- Known non planar 3D coordinates of scene points with a static camera.
    b- Planar 3D coordinates of scene points with dynamic camera
    c- Known non planar 3D coordinates of scene points with a dynamic camera
    d- Planar 3D coordinates of scene points with static camera

11- A stereo system of vision is composed by:
    a- Two cameras such that the image planes are planar
    b- Two cameras such that their image planes are not planar
    c- Two cameras

12- A simple stereo system is composed by:
    a- Two cameras such that the image planes are planar
    b- Two cameras such that their image planes are not planar
    c- A moving camera along the image plane

13- In case of simple stereo system, for depth computation:
    a- We need to know the calibration matrix.
    b- The disparity is sufficient
    c- We need to know the stereo correspondence of image points.