A Deep Learning Approach to Camera Pose Estimation

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Abstract—Camera pose estimation aims to find the absolute position of the camera within a given frame of a video. The estimation can be use in may ways, from object identification inside a known environment, to feature extraction combined with pose for 3D reconstruction.

Index Terms—component, formatting, style, styling, insert

I. Introduction

The camera pose can be expressed through two component:

1) a tuple of three elements that identifies the coordinates x,y and z

$$x_c = (x, y, z) \quad x, y, z \in \mathbb{R}$$
 (1)

2) a quaternion of four elements that identifies the rotation of the camera

$$q_c = (qw, qx, qy, qz) \quad qw, qx, qy, qz \in \mathbb{R}$$
 (2)

Consequentially the pose is referred as $p_c = (x_c, q_c)$. It is important to notice that this is not the only available representation of a pose.

Given an image I_c captured by a camera C, an absolute pose estimator E tries to predict the 3D pose orientation and location of C in world coordinates, defined for some arbitrary reference 3D model. The absolute pose estimation (APE) problem can be formally defined as the problem of estimating a function E taking an image I_c caputered by a camera C and outputting its respective pose:

$$E(I_c) = (x_c, q_c) \tag{3}$$

Another problem related to APE is relative pose estimation (RPE), in this kind of task the estimator takes two image I_c^1 and I_c^2 captured by C and aims to predict the relative pose between them. The equation 3 becomes:

$$E(I_c^1, I_c^2) = (x_c^{rel^2}, q_c^{rel})$$
(4)

where x_c^{rel} can be the absolute pose with *coordinates* reference system in I_c^1 or a translation vector from I_c^1 to I_C^2 .

II. EASE OF USE

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Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

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Number equations consecutively. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \tag{5}$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(5)", not "Eq. (5)" or "equation (5)", except at the beginning of a sentence: "Equation (5) is . . ."

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• The word "data" is plural, not singular.

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An excellent style manual for science writers is [7].

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Head	Table column subhead	Subhead	Subhead
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^aSample of a Table footnote.

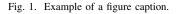


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ACKNOWLEDGMENT

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REFERENCES

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Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

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