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Data Article

Order type dataset analysis for fiducial markers

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ABSTRACT

Order Type (OT) describes a point set avoiding the use of metric information. We show that OT is a descriptor which is invariant to Euclidean geometric transformations, change of scale and perspective projection. In this paper we provide the data related to the application of Order Type with sets of 5, 6, 7, and 8 points to build fiducial markers. The OT is represented through a λ-matrix. We provide the set of points which are suitable to solve directly the point matching, because these have a unique associated λ-matrix. We provide maximal perturbation data for all set of points, maximal perturbation is the radius of the circle, centered in each point in the set, inside which each point can be moved without changing its associated OT. Also we provide the scripts to validate the use of OT in fiducial markers.

Specifications table

Subject area	*Computer Vision*
More specific subject area	*Augmented reality, Fiducial tags, Order Type*
Type of data	*Files with data in ASCII, program scripts in bash shell, and C source code.*
How data was acquired	*Original Order Type instances are provided in [1]. We change the sets with 5, 6, 7, and 8 points to ASCII format. All the other data is generated with the provided scripts and programs.*
Data format	*Numbers and labels in ASCII separated by spaces.*

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Experimental factors	*Experimental setup along its parameters described in* [2]
Experimental features	*Several quantitative and exhaustive experiments that validate the results in* [2].
Data source location	*N/A*
Data accessibility	*All files described in this paper are publicly available in* [3].
Related research article	*The data provided in this paper is the result of the research article in* [2].

Value of the data

- All data is provided to help to searchers and students in this field.
- The data about the set of points which are suitable to solve directly the point matching, can help pattern recognition researchers to choose and identify which are suitable for their own purposes.
- The maximal perturbation data for all set of points can be used to select a specific set of points in applications which require certain precision.
- The provided scripts and programs can be modified with other parameters to generate new data.
- The present work reduces the time and effort for other researches to introduce themselves to the order type concept.
- The provided datasets could help to develop and design other Order Type applications.

1. Data

This data is the result of the research paper in [2]. File names, description and attributes of the data are presented in Table 1. We provide data related to the OT instances suitable for point matching, two more related to the test of OT for Computer Vision applications, and one with the results of the maximal perturbation analysis (the robustness of OT to noise) [2]. Additionally we provide data and scripts to generate ray-traced images for testing OT as an Order Type Tag. All the data, except OT instances, are generated using the scripts presented in Table 2.

2. Experimental design

We performed different experiments to validate the proposed Order Type tags. First we transformed the point sets provided in [1] to ASCII format to obtain the C*n* files. The data provided in this paper is the half of the data in Table 1 in [2], this corresponds to the set of points with cardinality within 5 to 8. For each set of points point sets we compute the λ-matrix and verify that a unique minimal λ-matrix exists. This allows us to identify the set of point that are suitable for solving directly the point matching problem. Later, we compute the maximal perturbation values and we find the set of points with a maximal perturbation value greater than a threshold v, with v from 0.5 to 9.0 in steps of 0.5. Later, we generated synthetic images with the camera pinhole model to verify that OT can be retrieved from the set of points in perspective. Additionally, we test the Order Type tags with ray-traced images. We generated scenes using the Order Type Tag in Fig. 1 with different conditions of tilt and distance and we verified the correct tag identification. The generated datasets are described in Table 1 and the scripts associated to each dataset are presented in Table 2. Details, of the validations, experiments, parameters and implementations are detailed in [2].