A Global Approach for the Detection of Vanishing Points and Mutually Orthogonal Vanishing Directions
Supplementary Material of [1]

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1. Introduction

This document shows additional results of the *Uncapacitated Facility Location* (UFL) and *Hieararchical Facility Location* (HFL) algorithms for the detection of vanishing points (VPs) and mutually orthogonal vanishing directions (VDs) described in [1], on images of the York Urban Database (YUD) [2] and on images of our dataset.

2. Results on YUD using detected edges

We show in Fig. 1 and Fig. 2 the output of our HFL algorithm on 16 examples of the YUD database using edges extracted trough Tardif's detector [3] (two different examples are shown in [1]). The colors red, green and blue correspond to the directions of the Manhattan frame, while the other colors e.g. magenta, cyan, yellow, indicate non-orthogonal VPs. The edges marked in black received the empty (no VP) label. The left image shows the input edges (orange), while the right image shows the detected Manhattan directions and the non-orthogonal VPs.

3. Results on our dataset

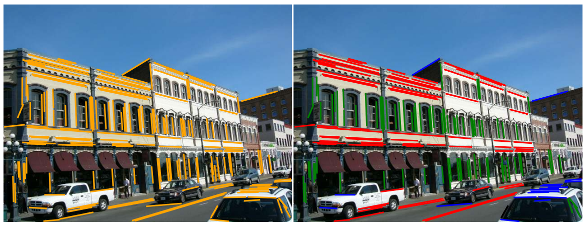
The images shown in Fig. 3 and Fig. 4 were captured using a Panasonic DMC digital camera that was calibrated in advance. We run Tardif's edge detector [3] for obtaining the input edges for our UFL and HFL algorithms. The output of our HFL algorithm is shown in Fig. 3 and Fig. 4. The colors red, green and blue correspond to the directions of the mutually orthogonal triplets, while the other colors e.g. magenta, cyan, yellow, indicate non-orthogonal VPs. The edges marked in black received the empty (no VP) label.

References

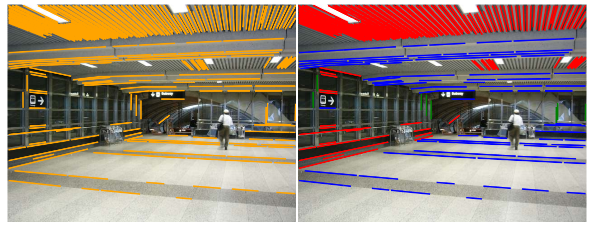
[1] M. Antunes and J. P. Barreto. A global approach for the detection of vanishing points and mutually orthogonal vanishing directions. In *CVPR*, 2013. 1

[2] P. Denis, J. H. Elder, and F. J. Estrada. Efficient edge-based methods for estimating manhattan frames in urban imagery. In *ECCV*, 2008. 1

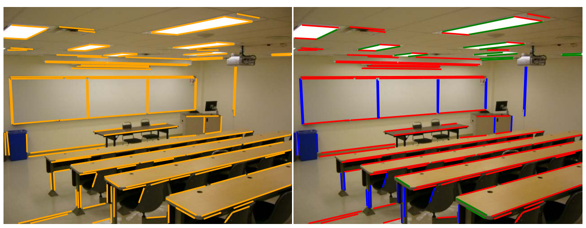
[3] J.-P. Tardif. Non-iterative approach for fast and accurate vanishing point detection. In *ICCV*, 2009. 1



(a) Example 1

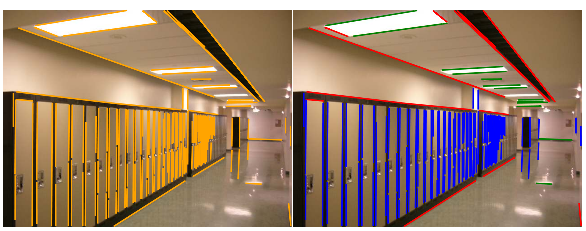


(b) Example 2



(c) Example 3

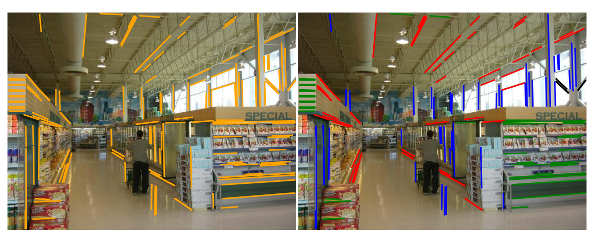
(d) Example 4



(e) Example 5

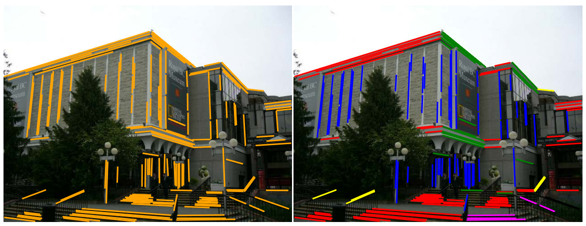
(f) Example 6

(g) Example 7



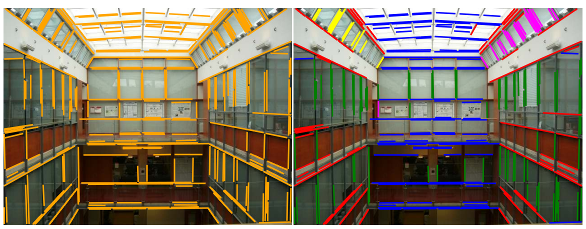
(h) Example 8

Figure 1. We show 8 examples from YUD. The left images show the input edges (orange), while the right images show the clustering results. The 3 directions of the Manhattan world are robustly detected (red, green and blue).

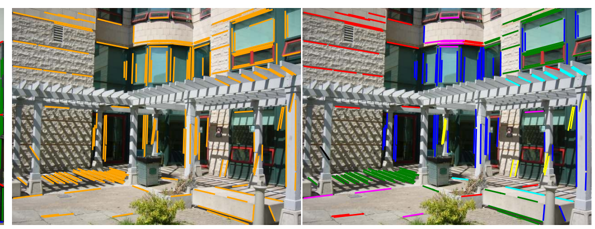


(a) Example 1

(b) Example 2

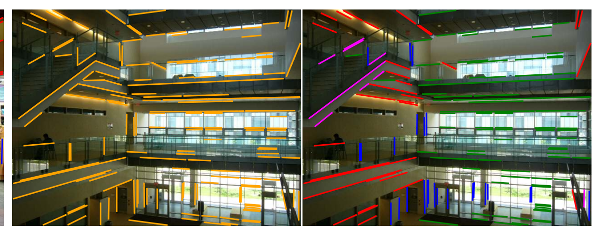


(c) Example 3

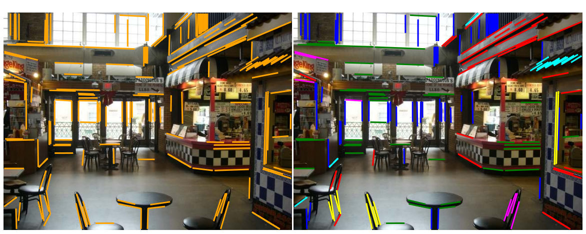


(d) Example 4

(e) Example 5



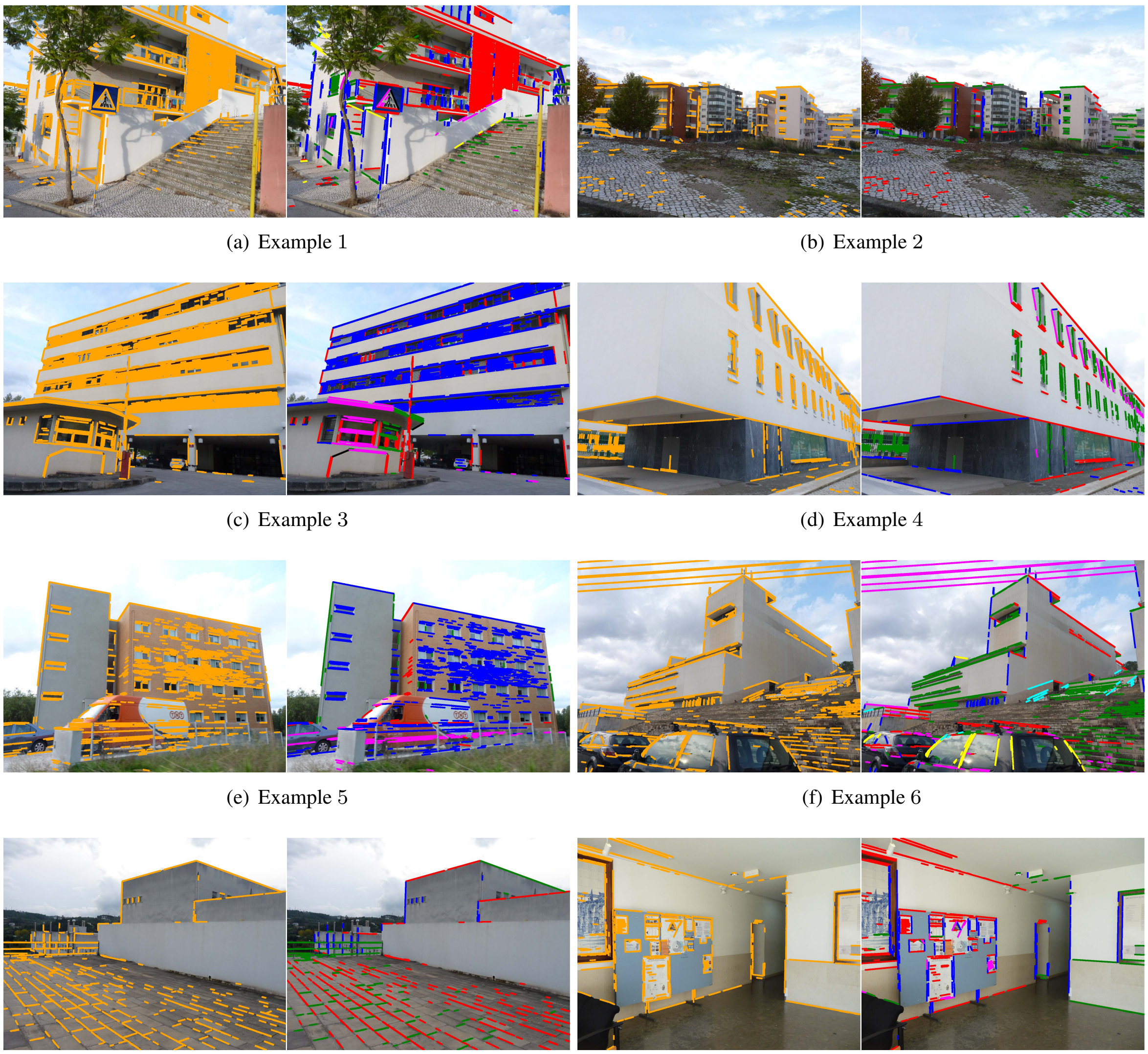
(f) Example 6



(g) Example 7

(h) Example 8

Figure 2. We show 8 examples from YUD. The left images show the input edges (orange), while the right images show the clustering results. We detect the VDs of the Manhattan world (red, green and blue), VPs that are non-orthogonal to the Manhattan triplet (yellow, magenta and cyan), and lines that are considered outliers (black, no VP is assigned). This is performed simultaneously by our algorithm.



(a) Example 1
(b) Example 2
(c) Example 3
(d) Example 4
(e) Example 5
(f) Example 6
(g) Example 7
(h) Example 8

Figure 3. We show 8 examples from our dataset. The left images show the input edges (orange), while the right images show the clustering results. We detect the VDs of the Manhattan world (red, green and blue), VPs that are non-orthogonal to the Manhattan triplet (yellow, magenta and cyan), and lines that are considered outliers (black, no VP is assigned). This is performed simultaneously by our algorithm.

(a) Input edges (b) Orthogonal triplet 1 (c) Orthogonal triplet 2

Figure 4. We show 6 examples from our dataset. The left images show the input edges (orange), while the right images show the clustering results. We detect the VDs of two different mutually orthogonal triplets. The lines clustered to VDs belonging to these mutually orthogonal triplets are marked in red, green and blue, and lines labeled with the same color in different triplets have the same VD. Lines assigned to non-orthogonal VPs are labeled in yellow and magenta, while lines that are considered outliers are black (no VP is assigned). We show two figures for the two different orthogonal triplets for the sake of clarity, however the detection of the two mutually orthogonal triplets and the non-orthogonal VPs is performed simultaneously by our algorithm.