ADAPTIVE ESTIMATION OF OPTIMAL COLOR TRANSFORMATIONS FOR DEEP CONVOLUTIONAL NETWORK BASED HOMOGRAPHY ESTIMATION

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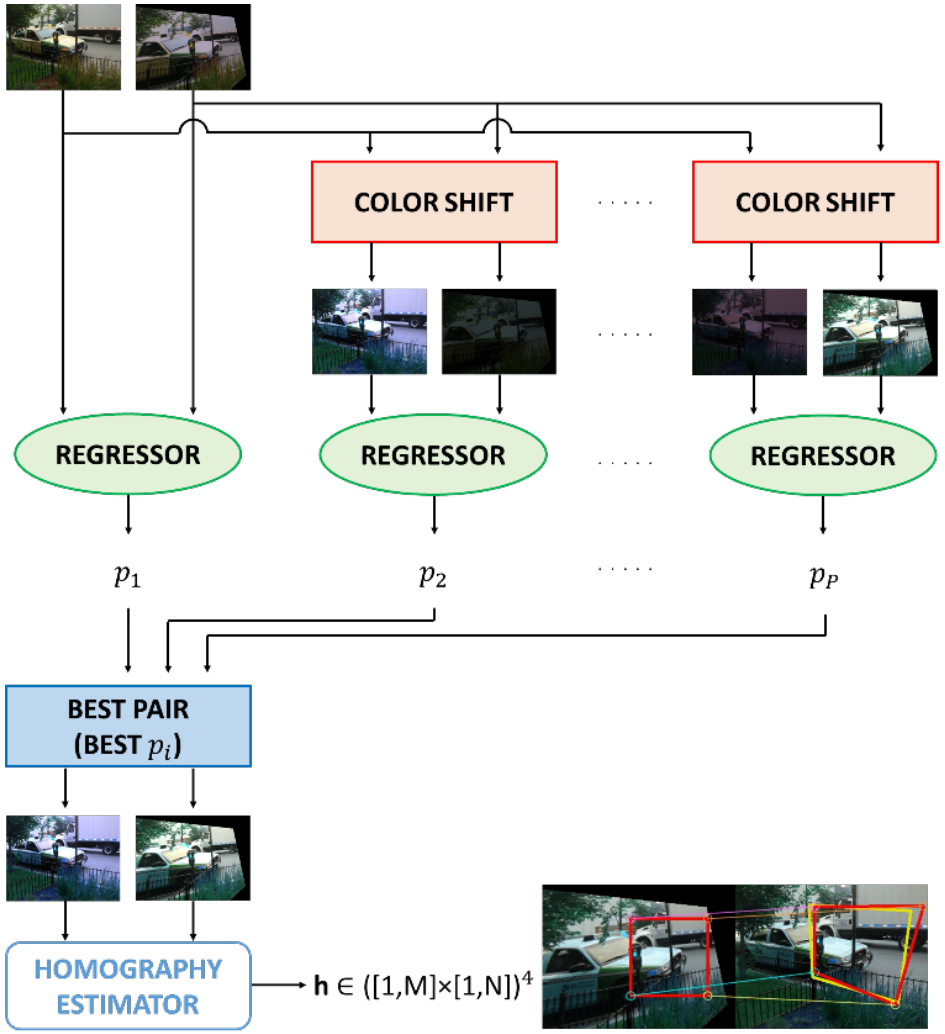
AGENDA

- Introduction
- Methodology
- Experimental setup
- Results
- Conclusions

INTRODUCTION

- Homography estimation
  - It consists of searching features correspondences between both images through a non-singular linear transformation
- Traditional approach
  - Correspondence of feature points
- New proposals
  - Deep learning
  - Consensus
  - Color transformation
    - Regressor

METHODOLOGY



- Several pairs of random color transformations are generated.
- To estimate the quality of the homography estimations by using a trained regressor.
- The pair of color transformations which is estimated to yield the best homography estimation performance is chosen.
- The estimated homography is computed by supplying the homography estimation network the pair of images obtained by applying the chosen pair of color transformations to the original image pair.

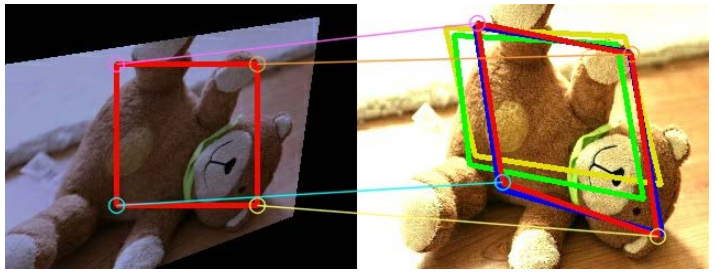
EXPERIMENTAL SETUP

- Methods
  - Molina-Cabello (2019), *Consensus*
  - Nguyen (2018), *Base*
  - Proposal, *ColorShift*

- Dataset:
  - 5,000 pairs of images has been created from the COCO dataset
    - 30 random color transformed pairs

RESULTS

- Images features and color transformation parameters analysis
  - Studied configurations:
    - Features from image pair and the color transformation
    - Different performance measures based on the RMSE
    - Group of samples
    - Regressor type
  - Best trained regressor
- Homography estimators comparison



Method	RMSE
Base	23.290 ± 10.561
Consensus Mean	21.064 ± 7.413
Consensus Median	22.256 ± 8.765
ColorShift	$\mathbf{11.172} \pm \mathbf{5.998}$

Ground truth — Base — Consensus Mean — ColorShift

CONCLUSIONS

- A new framework for the homography estimation issue is proposed
  - Convolutional deep learning network
  - A preprocessing module to estimate the best possible variation of the input images pair
    - Regressor
- Comparison
  - An improvement in the performance of the homography estimation
  - An improvement in the efficiency of the method with regard to the consensus-based model

Thank you for your attention

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