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Combining the capabilities of existing Deep Neural Network (DNN) architectures with the efficiency of a warping algorithm this work presents a novel method for image retargeting

In this paper we:

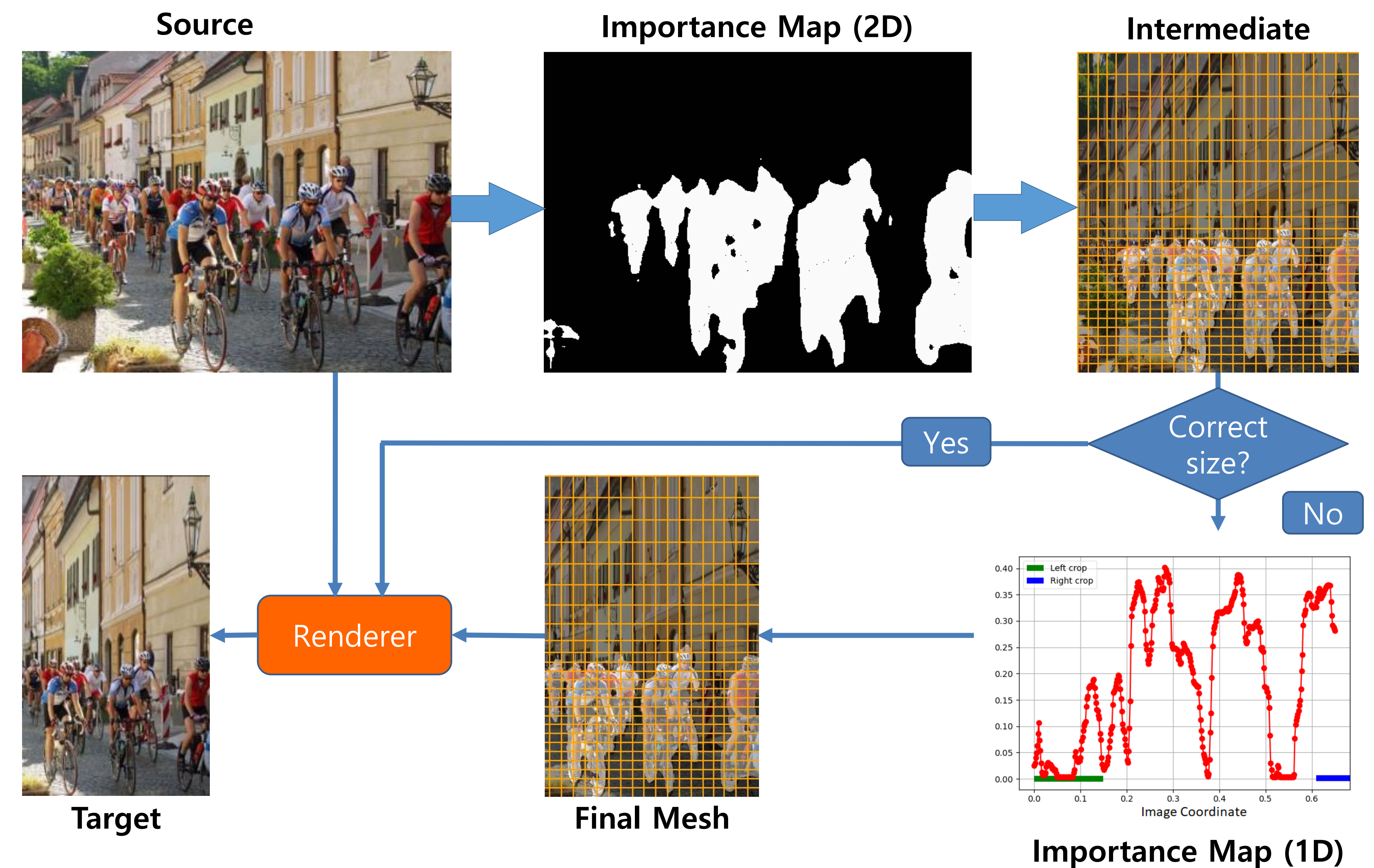
- Demonstrate that DNNs can be successfully used to produce importance maps required by a retargeting approach based on warping.
- Propose a novel, simple, and effective way to quantify distortions and to limit them with the use of content aware-cropping.
- Demonstrate via a user study that our method produces state-of-the-art results.
- Demonstrate the feasibility of retargeting on mobile devices which can be done interactively in real-time once a pre-processing step has been performed.

Method

An overview of our method is illustrated on the right. It consists of five stages:

1. Importance map generation;
2. Intermediate warping mesh generation;
3. Determination of cropping regions, if any;
4. Generation of final warping-cropping mesh;
5. Final rendering.

An importance map is produced using semantic segmentation and saliency detection. This map is fed to Axis Aligned Deformation (AAD) to produce an intermediate warping mesh. If this mesh matches the target size, then it is used to produce the target and the algorithm stops. Otherwise, content-aware cropping is performed, using a one dimensional version of the map.



Source (to 0.5)	Scale	Beltrami	CycleIR	AAD	Ours
User Study Votes:	0.429	0.545	0.480	0.475	0.572

To compare the quality of our method, we performed a user study using Amazon Mechanical Turk. Our study compared RetargetMe dataset images retargeted to 0.5 of their original width only. 294 surveys were used.

Source (to 0.33)	AAD	Ours

Conclusion

- Fully automated retargeting method.
- Combines the capabilities of DNNs for importance map generation, the efficiency of a warping algorithm, and a novel approach to quantify and limit warping distortions.
- By varying a single parameter (distortion threshold), the system can perform retargeting by warping-only, cropping-only, or a continuous range of hybrid scenarios in-between.
- Method allows fast retargeting: 35ms on desktop (T12080), and 130ms on mobile device (Samsung Galaxy Fold).