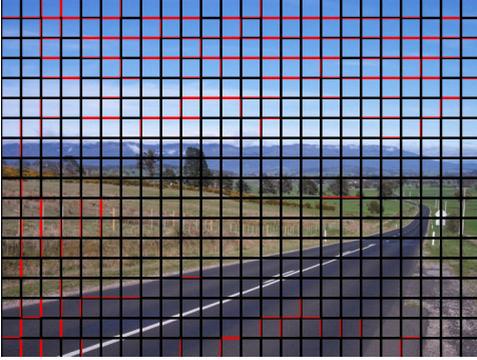


Solving Jigsaw Puzzles using Paths and Cycles - Supplementary Material

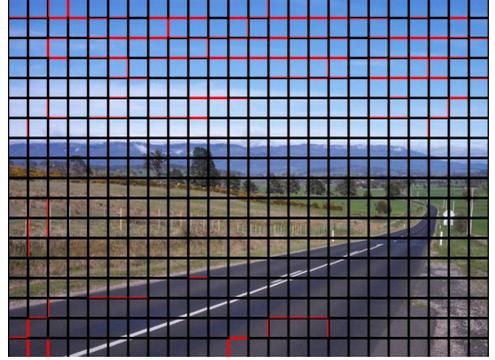
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Telecommunication Engineering
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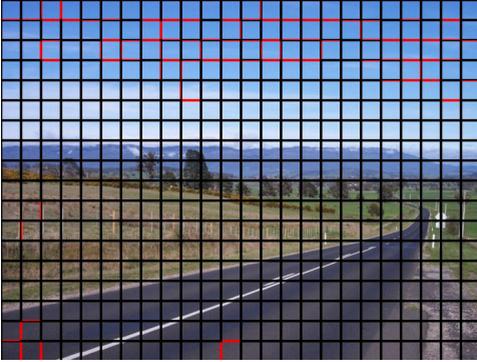
- Figure 1 visually illustrates the improvement in neighbor identification accuracy due to each of the proposed techniques for a puzzle with piece-size=28. Similar illustrations for two 14 piece-size puzzles are shown in Figures 2, 3.
- A visual comparison of assembly performance with the solvers of Pomeranz et al. [3], Gallagher [2] on 14 piece-size puzzles is presented in Figures 4, 5, 6, 7. Images belong to Cho et al.'s database [1]. Direct, Neighbor and Component metric values of each assembly are also indicated. The assemblies were obtained using the source code made available by the authors. In the case of Pomeranz et al.'s solver, the best assembly out of 10 runs with random seeds was picked.



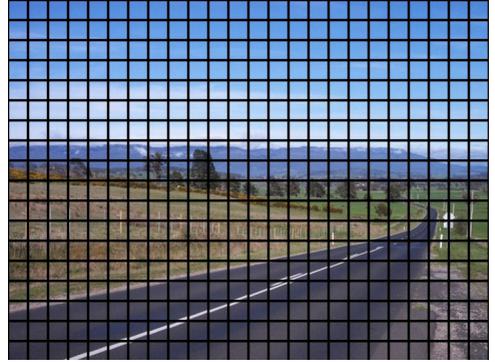
(a) Raw MGC Scores 86%



(b) After cost refinement 90%

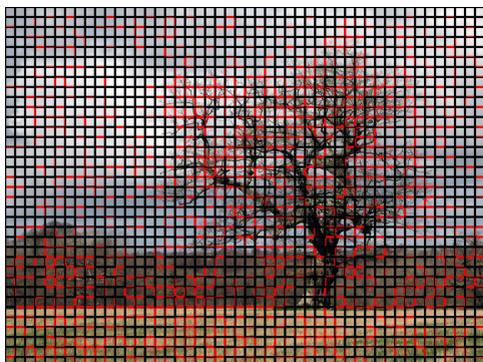


(c) After neighbor refinement 92%

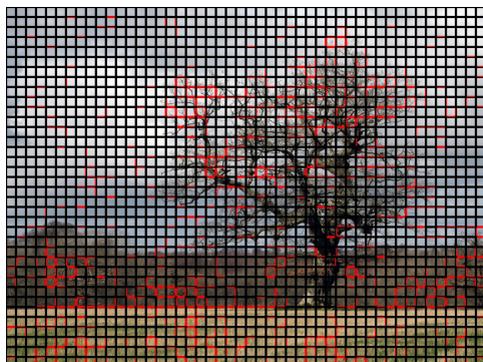


(d) After combining metrics 100%

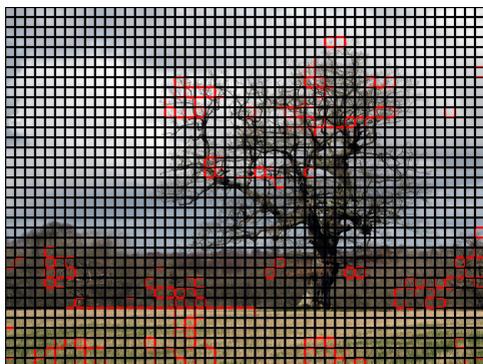
Figure 1: Incorrectly estimated neighbors (indicated by red markings on piece edges) after application of each improvement procedure - Image 12 of Cho et al.'s database [1] (piece size = 28)



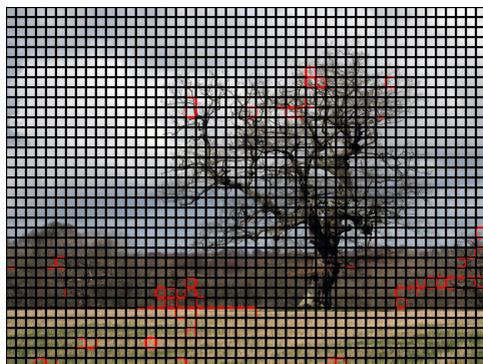
(a) Raw MGC Scores 74%



(b) After cost refinement 87%

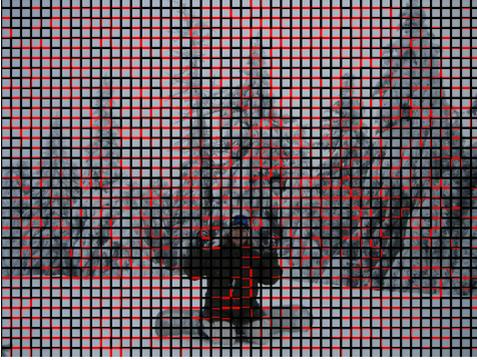


c After neighbor refinement 93%



d After combining metrics 97%

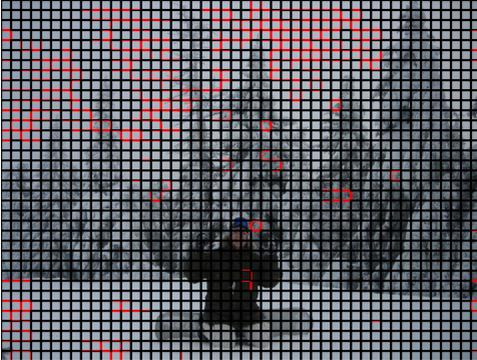
Figure 2: Incorrectly estimated neighbors (indicated by red markings on piece edges) after application of each improvement procedure - Image 10 of Cho et al.'s database [1] (piece size = 14)



(a) Raw MGC Scores 71%



(b) After cost refinement 85%



(c) After neighbor refinement 91%



(d) After combining metrics 97%

Figure 3: Incorrectly estimated neighbors (indicated by red markings on piece edges) after application of each improvement procedure - Image 11 of Cho et al.'s database [1] (piece size = 14)

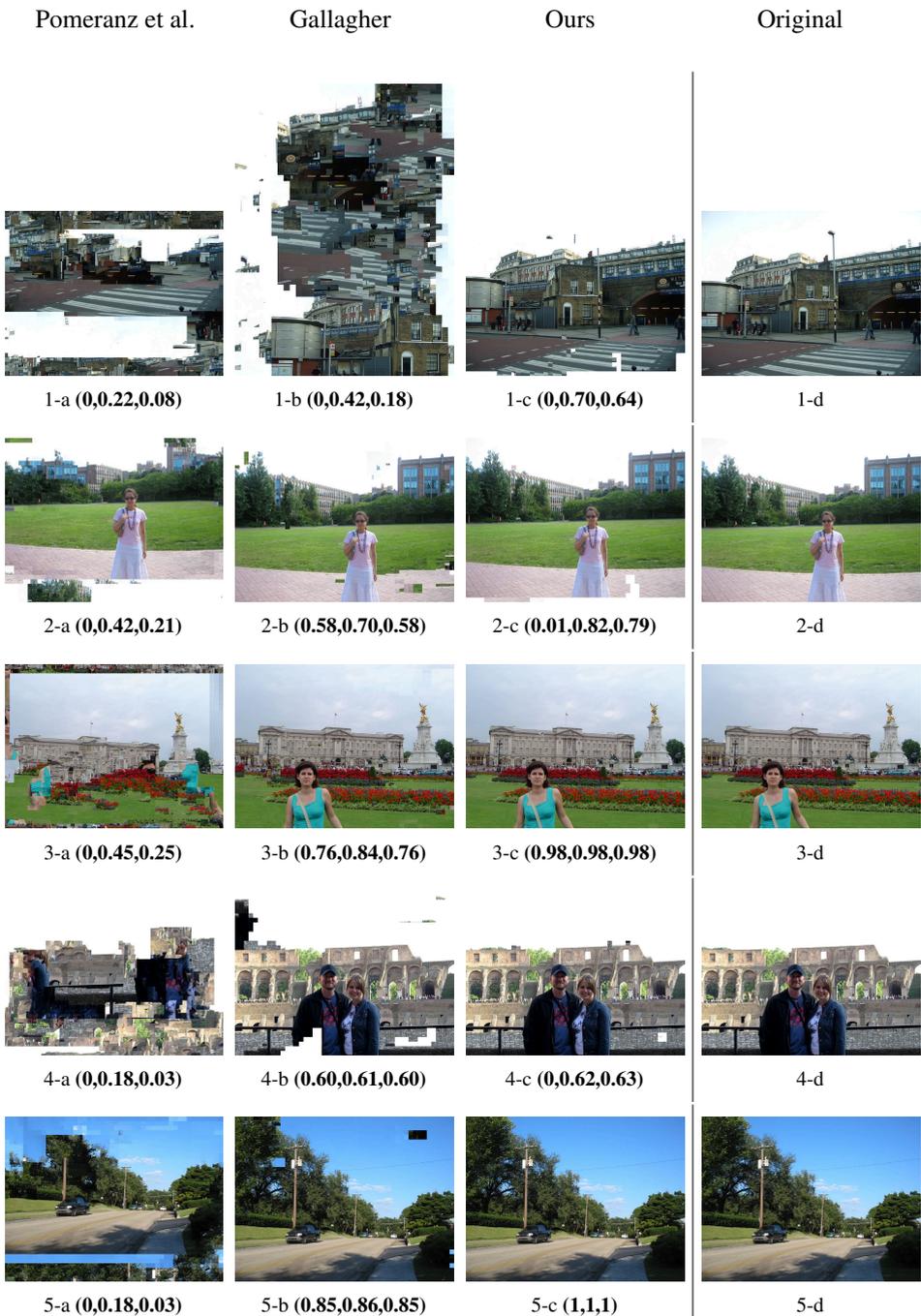


Figure 4: Visual comparison of 14 piece-size puzzle assembly. Images 1-5 of Cho et al.’s database [1]. In each row figures a,b,c show the puzzle assemblies of Pomeranz et al. [3], Gallagher [2] and ours respectively and d shows the original image. (Direct, Neighbor, Component) metric values of the assemblies are indicated in the captions.



Figure 5: Visual comparison of 14 piece-size puzzle assembly. Images 6-10 of Cho et al.'s database [1]. In each row figures a,b,c show the puzzle assemblies of Pomeranz et al. [3], Gallagher [2] and ours respectively and d shows the original image. (Direct, Neighbor, Component) metric values of the assemblies are indicated in the captions.

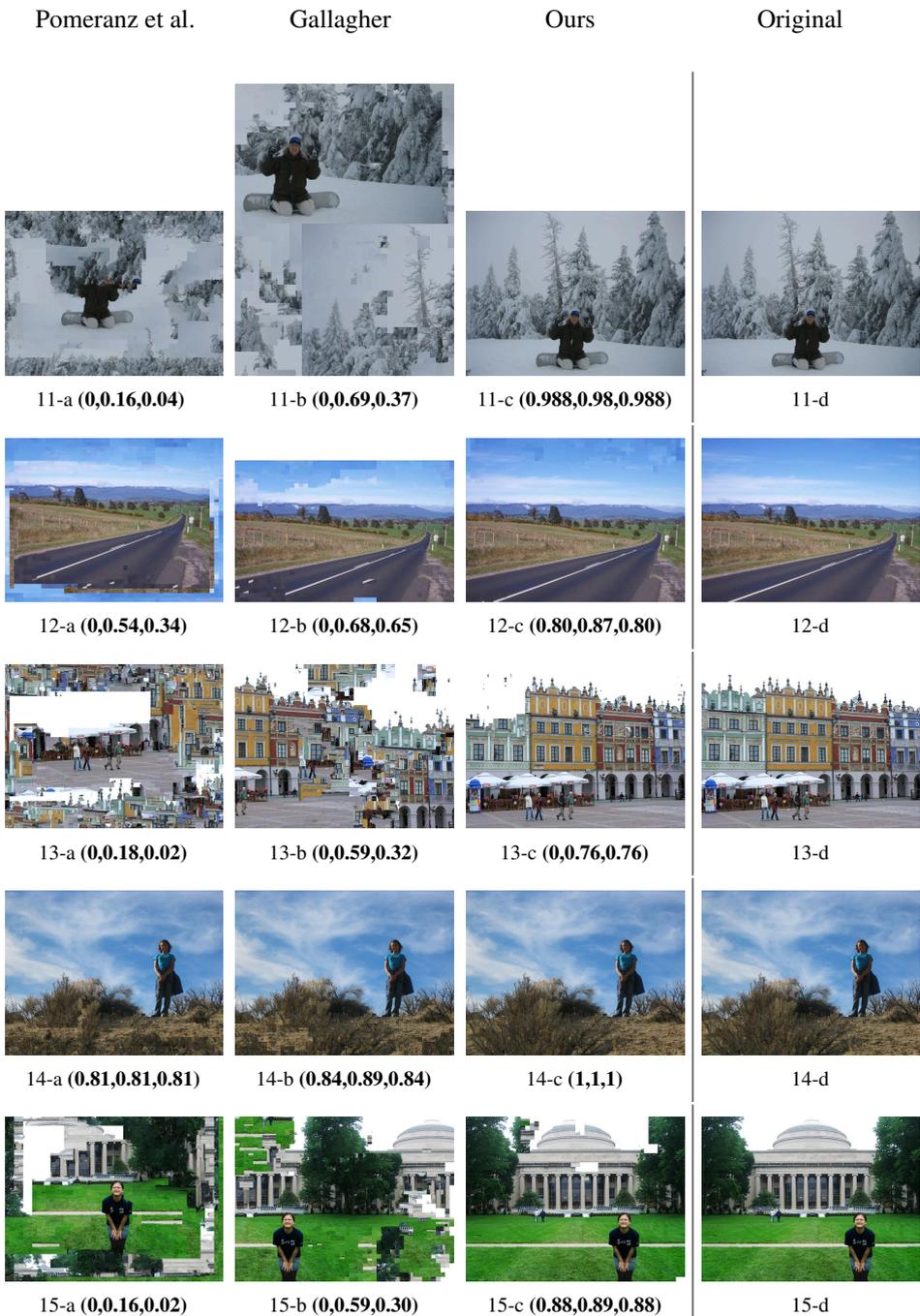


Figure 6: Visual comparison of 14 piece-size puzzle assembly. Images 11-15 of Cho et al.'s database [1]. In each row figures a,b,c show the puzzle assemblies of Pomeranz et al. [3], Gallagher [2] and ours respectively and d shows the original image. (Direct, Neighbor, Component) metric values of the assemblies are indicated in the captions.

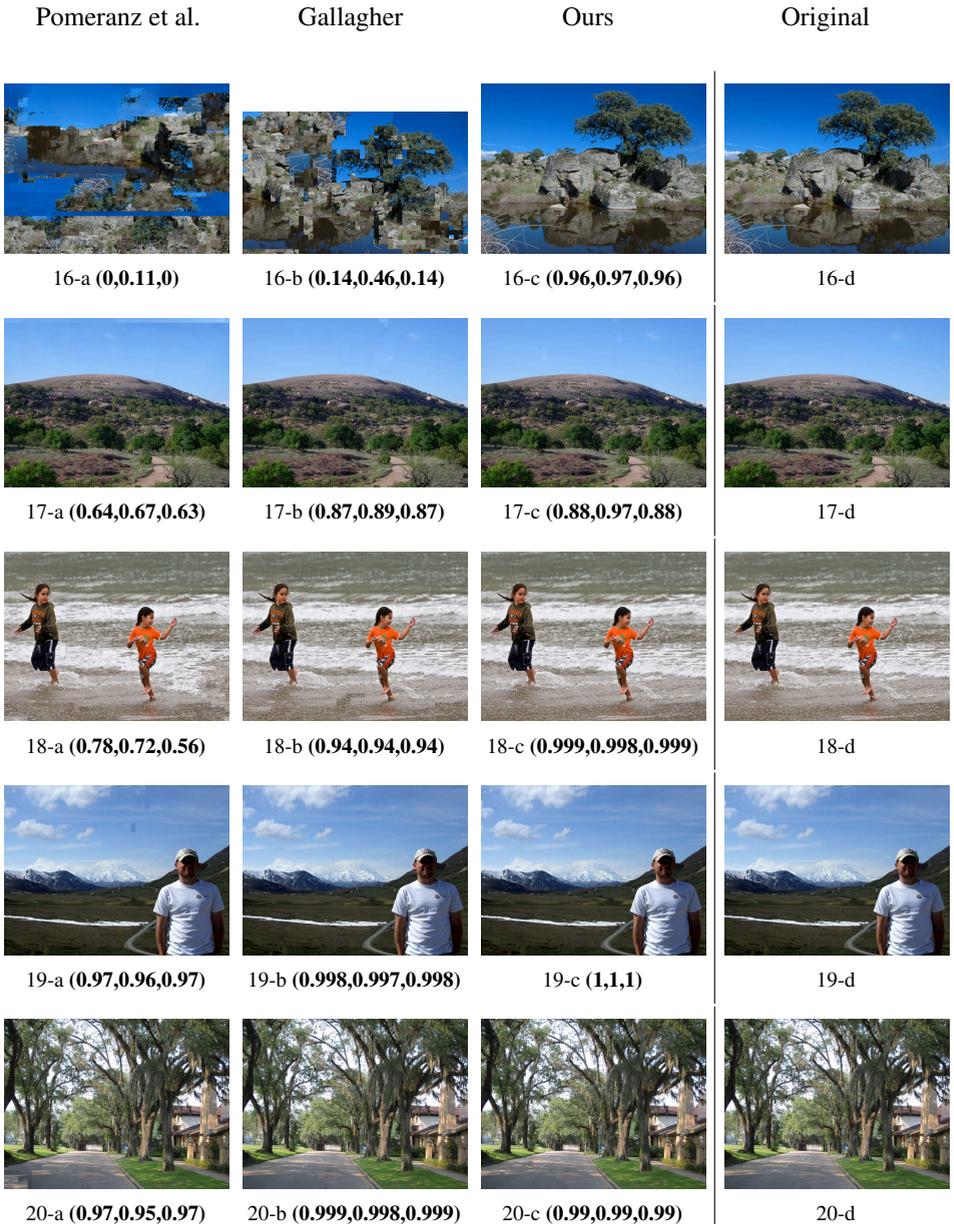


Figure 7: Visual comparison of 14 piece-size puzzle assembly. Images 16-20 of Cho et al.'s database [1]. In each row figures a,b,c show the puzzle assemblies of Pomeranz et al. [3], Gallagher [2] and ours respectively and d shows the original image. (Direct, Neighbor, Component) metric values of the assemblies are indicated in the captions.

References

- [1] Taeg Sang Cho, Shai Avidan, and William T. Freeman. A probabilistic image jigsaw puzzle solver. In *CVPR*, pages 183–190. IEEE, 2010.
- [2] Andrew C. Gallagher. Jigsaw puzzles with pieces of unknown orientation. In *CVPR*, pages 382–389. IEEE, 2012.
- [3] Dolev Pomeranz, Michal Shemesh, and Ohad Ben-Shahar. A fully automated greedy square jigsaw puzzle solver. In *CVPR*, pages 9–16. IEEE, 2011.