Make Your Enemy Your Friend: Improving Image Rotation Angle Estimation with Harmonics: supplementary material

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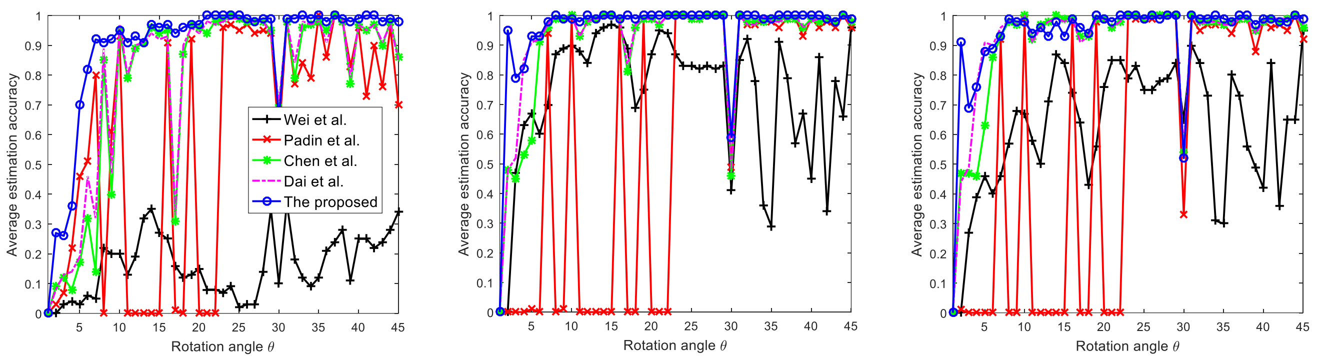
Due to the page limitation of the letter, we provide more detailed results of the proposed method in this supplementary file.

1) Fig. 1, 2, and 3 provide more detailed results corresponding to the paper's figures 5, 6, and 7.

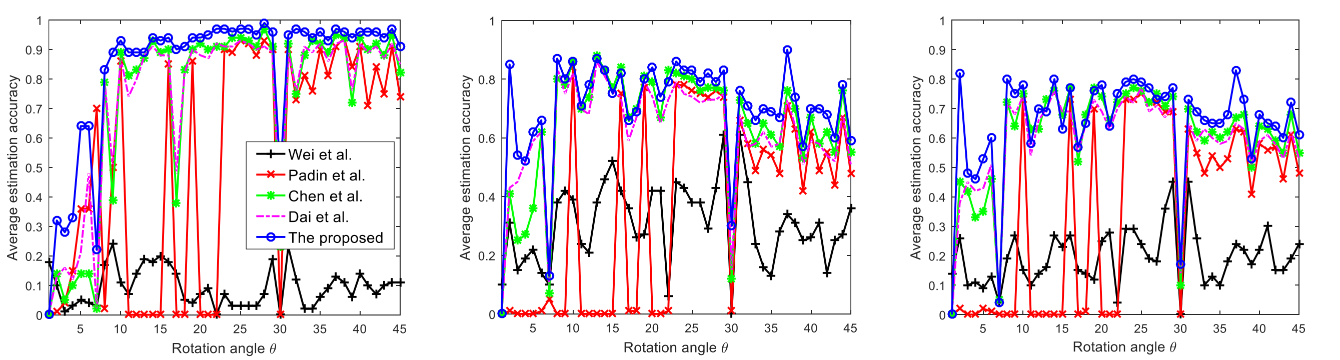
2) Fig. 4 illustrates the impact of the only hyper-parameter N_{har} of the proposed method. The rotated images are interpolated with the *nearest* kernel. N_{har} varies from 1 to 5. We also show the result of [1] in Fig. 4(a) for comparison. The proposed method performs steadily when $N_{har} \geq 2$. Hence, we adopt $N_{har} = 2$ in the paper for simplicity.

[1] C. Chen, J. Ni and Z. Shen, "Effective estimation of image rotation angle using spectral method," IEEE Signal Processing Letters, 21(7): 890–894, 2014.



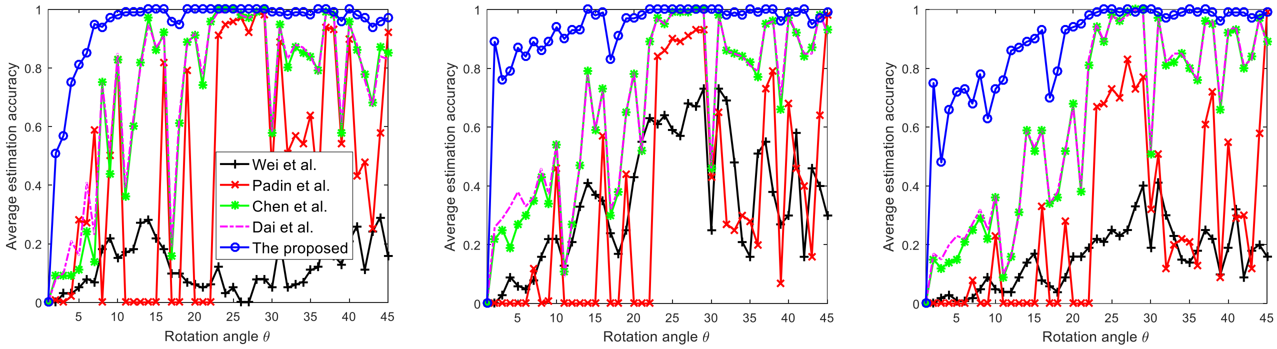
(a) (b) (c)

Fig. 1. Average estimation accuracy (%) over 500 uncompressed rotated images for different interpolation kernels. (a) Nearest, (b) Bilinear, (c) Bicubic. Fig. 1 (a), (b) and (c) share a legend for better visualization.



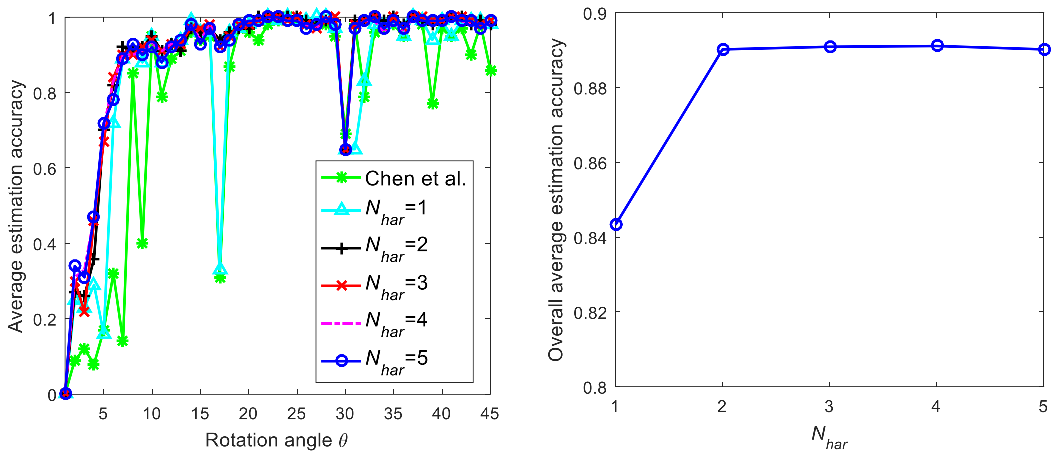
(a) (b) (c)

Fig. 2. Average estimation accuracy (%) over 500 JPEG compressed (QF=95) rotated images for different interpolation kernels. (a) Nearest, (b) Bilinear, (c) Bicubic.



(a) (b) (c)

Fig. 3. Average estimation accuracy (%) over 500 images undergone scaling-then-rotation for different interpolation kernels. (a) Nearest, (b) Bilinear, (c) Bicubic.



(a) (b)

Fig. 4. The impact of N_{har} of the proposed method. The rotated images are interpolated with the nearest kernel. (a) the estimation accuracy as a function of θ, (b) the overall average estimation accuracy.