



















- [29] A. A. Ross, J. Shah, and A. K. Jain. Toward reconstructing fingerprints from minutiae points. In *Biometric Technology for Human Identification II*, volume 5779, pages 68–80. International Society for Optics and Photonics, 2005.
- [30] J.-L. Starck, J. Fadili, and F. Murtagh. The undecimated wavelet decomposition and its reconstruction. *IEEE Transactions on Image Processing*, 16(2):297–309, February 2007.
- [31] P. Tome, M. Vanoni, and S. Marcel. On the vulnerability of finger vein recognition to spoofing. In *International Conference of the Biometrics Special Interest Group (BIOSIG)*, pages 1–10, 2014.
- [32] B. T. Ton and R. N. Veldhuis. A high quality finger vascular pattern dataset collected using a custom designed capturing device. In *International Conference on Biometrics (ICB)*, pages 1–5, 2013.
- [33] A. K. Tripathi, S. Mukhopadhyay, and A. K. Dhara. Performance metrics for image contrast. In *International Conference on Image Information Processing*, pages 1–4, 2011.
- [34] A. Uhl, C. Busch, S. Marcel, and R. Veldhuis. *Handbook of Vascular Biometrics*. Advances in Computer Vision and Pattern Recognition. Springer Nature Switzerland, 2019.
- [35] S. Venugopalan and M. Savvides. How to generate spoofed irises from an iris code template. *IEEE Transactions on Information Forensics and Security*, 6(2):385–395, 2011.
- [36] X. Yan, J. Yang, K. Sohn, and H. Lee. Attribute2image: Conditional image generation from visual attributes. In *European Conference on Computer Vision*, pages 776–791. Springer, 2016.
- [37] J. Zhang and J. Yang. Finger-vein image enhancement based on combination of gray-level grouping and circular gabor filter. In *International Conference on Information Engineering and Computer Science*, pages 1–4. IEEE, 2009.
- [38] J. Zhao, H. Tian, W. Xu, and X. Li. A new approach to hand vein image enhancement. In *Second International Conference on Intelligent Computation Technology and Automation*, volume 1, pages 499–501. IEEE, 2009.
- [39] K. Zuiderveld. Contrast limited adaptive histogram equalization. In *Graphics Gems IV*, pages 474–485. Academic Press Professional, Inc., 1994.