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Annotated Bibliography

Connaughton, Ryan, Kevin W. Bowyer, and Patrick J. Flynn. "Fusion of Face and Iris Biometrics." In *Handbook of Iris Recognition*, edited by Mark J. Burge and Kevin W. Bowyer, 219–37. Advances in Computer Vision and Pattern Recognition. Springer London, 2013. http://link.springer.com/chapter/10.1007/978-1-4471-4402-1_12.

I could not get access to this chapter of the book beyond the abstract and part of the introduction. It introduces the concept of Multi-Biometrics and how this can increase the accuracy of biometric recognition scans. They mention multi-sample, multi-instance, multi-sensor and multi-algorithm systems and how they can play a role in biometric identification.

Daugman, J. "How Iris Recognition Works." In *2002 International Conference on Image Processing. 2002. Proceedings*, 1:I – 33 – I – 36 vol.1, 2002. doi:10.1109/ICIP.2002.1037952.

———. "How Iris Recognition Works." *IEEE Trans. Cir. and Sys. for Video Technol.* 14, no. 1 (January 2004): 21–30. doi:10.1109/TCSVT.2003.818350.

A more recent publication of Daugman's break down on Iris Recognition. It identifies some of the changes in the approach to Iris recognition in eyelid detection, recognition regardless of the iris image size, position and orientation.

Daugman, J.G. "High Confidence Visual Recognition of Persons by a Test of Statistical Independence." *IEEE Transactions on Pattern Analysis and Machine Intelligence* 15, no. 11 (November 1993): 1148–61. doi:10.1109/34.244676.

This article goes into detail of the image analysis of the iris and the factors that go into the pattern recognition. There are a number of mathematical formulas, which focus on determining the changes in the irises size due to pupil dilation and contraction. Its also goes into detail on how to analyze texture of the iris from images using the Gabor filter. There are details in the coordinate system used to analyze the iris. There is a lot of detail in the Iris Codes background and its implementation.

Hollingsworth, Karen, Kevin W. Bowyer, and Patrick J. Flynn. "Pupil Dilation Degrades Iris Biometric Performance." *Computer Vision and Image Understanding* 113, no. 1 (January 2009): 150–57. doi:10.1016/j.cviu.2008.08.001.

———. "Pupil Dilation Degrades Iris Biometric Performance." *Comput. Vis. Image Underst.* 113, no. 1 (January 2009): 150–57. doi:10.1016/j.cviu.2008.08.001.

They examine a method of enrolling multiple iris images with different levels of pupil dilation. They explore adding a feature to currently in place systems to improve performance by having a a dilation aware enrollment phase. This is an alternative to the documented degrade in iris biometric performance due to pupil dilation.

Huang, Ya-Ping, Si-Wei Luo, and En-Yi Chen. "An Efficient Iris Recognition System." In *2002 International Conference on Machine Learning and Cybernetics, 2002. Proceedings*, 1:450–54 vol.1, 2002. doi:10.1109/ICMLC.2002.1176794.

This paper introduces a new iris recognition system. Its uses independent component analysis coefficients and a competitive learning mechanism and Euclidean distances. It would be another good comparison to make with existing systems and to see if these techniques can be made use of with existing methods.

Liao, Yifan. *Iris Acquisition Auto-Focusing System*, 2014.

This article describes the steps taken to effectively capture images for iris recognition through auto-focus. It discusses the different methods of auto-focusing and what range of effect they have. The study highlights the significant effect of having better quality images for iris recognition.

Ma, L., T. N. Tan, Y. H. Wang, and D. X. Zhang. "Efficient Iris Recognition by Characterizing Key Local Variations." *Ieee Transactions on Image Processing* 13, no. 6 (June 2004): 739–50. doi:10.1109/TIP.2004.827237.

This publication is aimed at comparing the different iris recognition methods (Intensity variation, texture analysis, phase based and zero -crossing representation). This is a good reference for identifying the different methods of the iris recognition and seeing through the documented experimental trials carried out by the authors, where each method stands.

Ortiz, Estefan, and Kevin W. Bowyer. "Dilation Aware Multi-Image Enrollment for Iris Biometrics." In *Proceedings of the 2011 International Joint Conference on Biometrics*, 1–7. IJCB '11. Washington, DC, USA: IEEE Computer Society, 2011. doi:10.1109/IJCB.2011.6117526.

They examine a method of enrolling multiple iris images with different levels of pupil dilation. They explore adding a feature to currently in place systems to improve performance by having a dilation aware enrollment phase. This is an alternative to the documented degrade in iris biometric performance due to pupil dilation.

Sun, Zhenan, and Tieniu Tan. "Iris Anti-Spoofing." In *Handbook of Biometric Anti-Spoofing*, edited by Sébastien Marcel, Mark S. Nixon, and Stan Z. Li, 103–23. Advances in Computer Vision and Pattern Recognition. Springer London, 2014. http://link.springer.com/chapter/10.1007/978-1-4471-6524-8_6.

I could not get access to this chapter of the book beyond the abstract and part of the introduction. It seems to outline the different levels of security issues that can be encountered in the iris recognition system and the possible ways to prevent this from happening.

Wildes, R.P. "Iris Recognition: An Emerging Biometric Technology." *Proceedings of the IEEE* 85, no. 9 (September 1997): 1348–63. doi:10.1109/5.628669.

———. "Iris Recognition: An Emerging Biometric Technology." *Proceedings of the IEEE* 85, no. 9 (September 1997): 1348–63. doi:10.1109/5.628669.

Covers the technical issues of iris recognition and the status of the systems in place at the time. He focuses on Daugman and Wildes' iris recognition systems The issues that he covers are both high and good quality image acquisition, iris localization systems. There issues pertaining to pattern matching such as alignment, representation (size, detail of texture), goodness of the match and how they make the final decision

Yadav, D., N. Kohli, J.S. Doyle, R. Singh, M. Vatsa, and K.W. Bowyer. “Unraveling the Effect of Textured Contact Lenses on Iris Recognition.” *IEEE Transactions on Information Forensics and Security* 9, no. 5 (May 2014): 851–62. doi:10.1109/TIFS.2014.2313025.

———. “Unraveling the Effect of Textured Contact Lenses on Iris Recognition.” *IEEE Transactions on Information Forensics and Security* 9, no. 5 (May 2014): 851–62. doi:10.1109/TIFS.2014.2313025.

A new challenge to iris recognition is the use of cosmetic textured contact lenses and soft lenses. The paper presents details on how the contacts lenses affect the accuracy of the system. The effects of the lenses are also analyzed with different acquisition devices. Recognition accuracy is mostly reduced with textured lenses. An algorithm for lense detection is suggested to improve security in future spoofing attempts however a better algorithm is needed and a solution hasn’t been proposed to allow textured lenses to be worn for iris recognition scans.

Zhu, Yong, Tieniu Tan, and Yunhong Wang. “Biometric Personal Identification Based on Iris Patterns.” In *15th International Conference on Pattern Recognition, 2000. Proceedings*, 2:801–4 vol.2, 2000. doi:10.1109/ICPR.2000.906197.

———. “Biometric Personal Identification Based on Iris Patterns.” In *15th International Conference on Pattern Recognition, 2000. Proceedings*, 2:801–4 vol.2, 2000. doi:10.1109/ICPR.2000.906197.
(A short yet detailed article on an efficient way of identifying iris patterns. Its introduces ideas based on previously established ideas by Wildes, Boles and Daugman. I would use this to compare the existing methods with new algorithms being discussed.)