

The Enigma of Dark Matter

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1 Section 1

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2 Section 2

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References

- [1] V. Hristidis, S.-C. Chen, T. Li, S. Luis, Y. Deng, Survey of data management and analysis in disaster situations, *J. Syst. Softw.* **83** (2010) 1701–1714.
- [2] N.R. Adam, B. Shafiq, R. Stan, Spatial computing and social media in the context of disaster management, *IEEE Intell. Syst.* **27** (2012) 90–96.
- [3] X. Song, L. Sun, J. Lei, D. Tao, G. Yuan, M. Song, Event-based large scale surveillance video summarization, *Neurocomputing* **187** (2016) 66–74.

- [4] R. Chi, Z.-M. Lu, Q.-G. Ji, Real-time multi-feature based fire flame detection in video, *IET Image Process.* **11** (2016) 31–37.
- [5] S.-W. Lo, J.-H. Wu, F.-P. Lin, C.-H. Hsu, Cyber surveillance for flood disasters, *Sensors* **15** (2015) 2369–2387.
- [6] T.-H. Chen, P.-H. Wu, Y.-C. Chiou, An early fire-detection method based on image processing, in: *Proceedings of International Conference on Image Processing, ICIP'04*, 2004, pp. 1707–1710.
- [7] D. Guha-Sapir, F. Vos, R. Below, S. Penserre, Annual disaster statistical review 2015: the numbers and trends, 2015. http://www.cred.be/sites/default/files/ADSR_2015.pdf.
- [8] T. Toulouse, L. Rossi, M. Akhloufi, T. Celik, X. Maldague, Benchmarking of wildland fire colour segmentation algorithms, *IET Image Process.* **9** (2015) 1064–1072.
- [9] T. Qiu, Y. Yan, G. Lu, An autoadaptive edge-detection algorithm for flame and fire image processing, *IEEE Trans. Instrum. Meas.* **61** (2012) 1486–1493.
- [10] C.-B. Liu, N. Ahuja, Vision based fire detection, in: *Proceedings of the 17th International Conference on Pattern Recognition, ICPR 2004*, 2004, pp. 134–137.
- [11] T. Celik, H. Demirel, H. Ozkaramanli, M. Uyguroglu, Fire detection using statistical color model in video sequences, *J. Vis. Commun. Image Represent.* **18** (2007) 176–185.
- [12] B.C. Ko, S.J. Ham, J.Y. Nam, Modeling and formalization of fuzzy finite automata for detection of irregular fire flames, *IEEE Trans. Circuits Syst. Video Technol.* **21** (2011) 1903–1912.
- [13] P. Foggia, A. Saggese, M. Vento, Real-time fire detection for video-surveillance applications using a combination of experts based on color, shape, and motion, *IEEE Trans. Circuits Syst. Video Technol.* **25** (2015) 1545–1556.
- [14] M. Mueller, P. Karasev, I. Kolesov, A. Tannenbaum, Optical flow estimation for flame detection in videos, *IEEE Trans. Image Process.* **22** (2013) 2786–2797.
- [15] B.U. Töreyin, Y. Dedeoğlu, U. Güdükbay, A.E. Cetin, Computer vision based method for real-time fire and flame detection, *Pattern Recogn. Lett.* **27** (2006) 49–58.
- [16] R.C. Luo, K.L. Su, Autonomous fire-detection system using adaptive sensory fusion for intelligent security robot, *IEEE/ASME Trans. Mechatron.* **12** (2007) 274–281.
- [17] P.V.K. Borges, E. Izquierdo, A probabilistic approach for vision-based fire detection in videos, *IEEE Trans. Circuits Syst. Video Technol.* **20** (2010) 721–731.
- [18] I. Mehmood, M. Sajjad, S.W. Baik, Mobile-cloud assisted video summarization framework for efficient management of remote sensing data generated by wireless capsule sensors, *Sensors* **14** (2014) 17112–17145.
- [19] A. Sorbara, E. Zereik, M. Bibuli, G. Bruzzone, M. Caccia, Low cost optronic obstacle detection sensor for unmanned surface vehicles, in: *Proceedings of IEEE Sensors Applications Symposium, SAS*, 2015, pp. 1–6.
- [20] B.C. Ko, K.-H. Cheong, J.-Y. Nam, Fire detection based on vision sensor and support vector machines, *Fire Saf. J.* **44** (2009) 322–329.

- [21] K. Dimitropoulos, P. Barmpoutis, N. Grammalidis, Spatio-temporal flame modeling and dynamic texture analysis for automatic video-based fire detection, *IEEE Trans. Circuits Syst. Video Technol.* **25** (2015) 339–351.
- [22] Z. Zhang, J. Zhao, D. Zhang, C. Qu, Y. Ke, B. Cai, Contour based forest fire detection using FFT and wavelet, in: *Proceedings of International Conference on Computer Science and Software Engineering*, 2008, pp. 760–763.
- [23] T. Celik, H. Demirel, Fire detection in video sequences using a generic color model, *Fire Saf. J.* **44** (2009) 147–158.
- [24] G. Marbach, M. Loepfe, T. Bruppacher, An image processing technique for fire detection in video images, *Fire Saf. J.* **41** (2006) 285–289.
- [25] W. Phillips Iii, M. Shah, N.da Vitoria Lobo, Flame recognition in video, *Pattern Recogn. Lett.* **23** (2002) 319–327.
- [26] D. Han, B. Lee, Development of early tunnel fire detection algorithm using the image processing, in: *Proceedings of International Symposium on Visual Computing*, 2006, pp. 39–48.
- [27] A. Rahman, M. Murshed, Detection of multiple dynamic textures using feature space mapping, *IEEE Trans. Circuits Syst. Video Technol.* **19** (2009) 766–771.
- [28] T.-H. Chan, K. Jia, S. Gao, J. Lu, Z. Zeng, Y. Ma, PCANet: a simple deep learning baseline for image classification? *IEEE Trans. Image Process.* **24** (2015) 5017–5032.
- [29] B. Jiang, J. Yang, Z. Lv, K. Tian, Q. Meng, Y. Yan, Internet cross-media retrieval based on deep learning, *J. Vis. Commun. Image Represent.* **48** (2017) 356–366.
- [30] J. Yang, B. Jiang, B. Li, K. Tian, Z. Lv, A fast image retrieval method designed for network big data, *IEEE Trans. Ind. Inform.* **13**(5) (2017) 2350–2359.
- [31] R. Girshick, J. Donahue, T. Darrell, J. Malik, Region-based convolutional networks for accurate object detection and segmentation, *IEEE Trans. Pattern Anal. Mach. Intell.* **38** (2016) 142–158.
- [32] S. Anwar, K. Hwang, W. Sung, Fixed point optimization of deep convolutional neural networks for object recognition, in: *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP*, 2015, pp. 1131–1135.
- [33] V. Kantorov, M. Oquab, M. Cho, I. Laptev, ContextLocNet: context-aware deep network models for weakly supervised localization, in: *Proceedings of European Conference on Computer Vision*, 2016, pp. 350–365.
- [34] W. Zhang, R. Li, H. Deng, L. Wang, W. Lin, S. Ji, et al., Deep convolutional neural networks for multi-modality isointense infant brain image segmentation, *NeuroImage* **108** (2015) 214–224.
- [35] W. Liu, Z. Wang, X. Liu, N. Zeng, Y. Liu, F.E. Alsaadi, A survey of deep neural network architectures and their applications, *Neurocomputing* **234** (2017) 11–26.
- [36] A. Krizhevsky, I. Sutskever, G.E. Hinton, Imagenet classification with deep convolutional neural networks, in: *Proceedings of Advances in Neural Information Processing Systems*, 2012, pp. 1097–1105.

- [37] M. Sun, Z. Song, X. Jiang, J. Pan, Y. Pang, Learning pooling for convolutional neural network, *Neurocomputing* **224** (2017) 96–104.
- [38] S.J. Pan, Q. Yang, A survey on transfer learning, *IEEE Trans. knowl. Data Eng.* **22** (2010) 1345–1359.
- [39] J. Deng, W. Dong, R. Socher, L.-J. Li, K. Li, L. Fei-Fei, Imagenet: a large-scale hierarchical image database, in: *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition, CVPR*, 2009, pp. 248–255.
- [40] A.O. Bicen, V.C. Gungor, O.B. Akan, Delay-sensitive and multimedia communication in cognitive radio sensor networks, *Ad Hoc Netw.* **10** (2012) 816–830.
- [41] D. Jiang, X. Ying, Y. Han, Z. Lv, Collaborative multi-hop routing in cognitive wireless networks, *Wirel. Pers. Commun.* **86** (2016) 901–923.
- [42] I.F. Akyildiz, T. Melodia, K.R. Chowdhury, A survey on wireless multimedia sensor networks, *Comput. Netw.* **51** (2007) 921–960.
- [43] R. Umar, A.U. Sheikh, A comparative study of spectrum awareness techniques for cognitive radio oriented wireless networks, *Phys. Commun.* **9** (2013) 148–170.
- [44] I. Mahmood, M. Sajjad, W. Ejaz, S.W. Baik, Saliency-directed prioritization of visual data in wireless surveillance networks, *Inf. Fusion* **24** (2015) 16–30.
- [45] W. Zhang, R.K. Mallik, K.B. Letaief, Optimization of cooperative spectrum sensing with energy detection in cognitive radio networks, *IEEE Trans. Wirel. Commun.* **8** (2009).
- [46] D.Y. Chino, L.P. Avalhais, J.F. Rodrigues, A.J. Traina, BoWFire: detection of fire in still images by integrating pixel color and texture analysis, in: *Proceedings of the 28th 2015 Conference on Graphics, Patterns and Images, SIBGRAPI*, 2015, pp. 95–102.
- [47] S. Verstockt, T. Beji, P. De Potter, S. Van Hoecke, B. Sette, B. Merci, et al., Video driven fire spread forecasting (f) using multi-modal LWIR and visual flame and smoke data, *Pattern Recogn. Lett.* **34** (2013) 62–69.
- [48] Y. Jia, E. Shelhamer, J. Donahue, S. Karayev, J. Long, R. Girshick, et al., Caffe: convolutional architecture for fast feature embedding, in: *Proceedings of the 22nd ACM International Conference on Multimedia*, 2014, pp. 675–678.
- [49] R. Di Lascio, A. Greco, A. Saggese, M. Vento, Improving fire detection reliability by a combination of videoanalytics, in: *Proceedings of International Conference on Image Analysis and Recognition*, 2014, pp. 477–484.
- [50] Y.H. Habiboglu, O. Günay, A.E. Çetin, Covariance matrix-based fire and flame detection method in video, *Mach. Vis. Appl.* **23** (2012) 1103–1113.
- [51] A. Rafiee, R. Dianat, M. Jamshidi, R. Tavakoli, S. Abbaspour, Fire and smoke detection using wavelet analysis and disorder characteristics, in: *Proceedings of the 3rd International Conference on Computer Research and Development ICCRD*, 2011, pp. 262–265.
- [52] K. Muhammad, M. Sajjad, M.Y. Lee, S.W. Baik, Efficient visual attention driven framework for key frames extraction from hysteroscopy videos, *Biomed. Signal Process. Control* **33** (2017) 161–168.

- [53] K. Muhammad, J. Ahmad, M. Sajjad, S.W. Baik, Visual saliency models for summarization of diagnostic hysteroscopy videos in healthcare systems, *SpringerPlus* **5** (2016) 1495.
- [54] L. Rossi, M. Akhloufi, Y. Tison, On the use of stereovision to develop a novel instrumentation system to extract geometric fire fronts characteristics, *Fire Saf. J.* **46** (2011) 9–20.
- [55] S. Rudz, K. Chetehouna, A. Hafiane, H. Laurent, O. Séro-Guillaume, Investigation of a novel image segmentation method dedicated to forest fire applications, *Meas. Sci. Technol.* **24** (2013) 075403.
- [56] K. Muhammad, M. Sajjad, I. Mehmood, S. Rho, S.W. Baik, A novel magic LSB substitution method (M-LSB-SM) using multi-level encryption and achromatic component of an image, *Multimed. Tools Appl.* **75** (2016) 14867–14893.
- [57] R.J. Mstafa, K.M. Elleithy, A video steganography algorithm based on Kanade–Lucas–Tomasi tracking algorithm and error correcting codes, *Multimed. Tools Appl.* **75** (2016) 10311–10333.
- [58] X.-L. Liu, C.-C. Lin, S.-M. Yuan, Blind dual watermarking for color images' authentication and copyright protection, *IEEE Trans. Circuit Syst. Video Technol.* (2016), doi: 10.1109/TCSVT.2016.2633878.
- [59] K. Muhammad, M. Sajjad, I. Mehmood, S. Rho, S.W. Baik, Image steganography using uncorrelated color space and its application for security of visual contents in online social networks, *Future Gener. Comput. Syst.* (2016), doi: 10.1016/j.future.2016.11.029.
- [60] K. Muhammad, J. Ahmad, S. Rho, S.W. Baik, Image steganography for authenticity of visual contents in social networks, *Multimed. Tools Appl.* **76**(18) (2017) 18985–19004.