performance of the segmentation algorithms was evaluated by obtaining the percentage of correctly segmented image. The best segmentation algorithm was the Algorithm ID 7, by observing its performance for three burn depths. The performance of the segmentation algorithms has a huge impact on the performance in the classification of skin burn depths, as the feature extraction and classification are largely dependent on the segmented burn wound region. If the segmented burn wound region is correctly segmented in terms of the algorithm able to detect the boundary of a burn wound region adequately, then this will help in contributing to the features extracted as well as in the classification result. In future work, the segmentation algorithms need to be improved by considering all the issues surrounding the nature of the skin burn wound images, so that the percentage of correctly segmented images can be improved especially for FTB images. Besides that, a segmentation algorithm that can detect a darker color in FTB image to enable a correct segmentation of more severe FTB image will also be studied as future work.

REFERENCES

[1] "Boundless Anatomy and Physiology in Structure of the Skin: Dermis," 2016. [Online]. Available: https://www.boundless.com/physiology/textbooks/boundless-anatomy-and-physiology-textbook/integumentary-system-5/the-skin-64/structure-of-the-skin-dermis-395-7489/.

[2] A. L. Mescher, *Junqueira's Basic Histology: Text and Atlas*, 14th ed. New York: McGraw-Hill Education, 2016

[3] "Burn Classification," *UNM hospitals*. [Online]. Available: http://hospitals.unm.edu/burn/classification.shtml.

[4] M. S. Badea, C. Vertan, C. Florea, L. Florea, and S. Badoiu, "Automatic Burn Area Identification in Color Images," in *Proceedings of the 2016 International Conference on Communications (COMM)*, 2016, pp. 65–68.

[5] H. S. Tran, T. H. Le, and T. T. Nguyen, "The Degree of Skin Burns Images Recognition using Convolutional Neural Network," *Indian Journal of Science and Technology*, vol. 9, no. 45, 2016.

[6] O. Despo, S. Yeung, J. Jopling, B. Pridgen, C. Sheckter, S. Silberstein, F. F. Li, and A. Milstein, "BURNED: Towards Efficient and Accurate Burn Prognosis Using Deep Learning," 2017.

[7] R. Sudhir, "A Survey on Image Mining Techniques: Theory and Applications," *Computer Engineering and Intelligent Systems*, vol. 2, no. 6, pp. 44–52, Oct. 2011.

[8] P. Kaur and K. Kaur, "Review of Different Existing Image Mining Techniques," *International Journal of Advanced Research in Computer Science and Software Engineering*, vol. 4, no. 6, pp. 518–524, 2014.

[9] B. Acha, C. Serrano, J. I. Acha, and L. M. Roa, "CAD Tool for Burn Diagnosis," *Information Processing in Medical Imaging*, vol. 18, pp. 294–305, 2003.

[10] A. S. Deshpande and G. Amruta, "Automated Detection of Skin Cancer and Skin Allergy," *International Journal of Advance Research in Computer Science and Management Studies*, vol. 4, no. 1, pp. 248–261, 2016.

[11] M. Suvarna, Sivakumar, K. Kumar, and U. C. Niranjan, "Diagnosis of Burn Images Using Template Matching, K-Nearest Neighbor and Artificial Neural Network," *International Journal of Image Processing (IJIP)*, vol. 7, no. 2, pp. 191–202, 2013.

[12] R. Sumithra, M. Suhil, and D. S. Guru, "Segmentation and Classification of Skin Lesions for Disease Diagnosis," *Procedia Computer Science*, vol. 45, pp. 76–85, 2015.

[13] Y. Li and L. Shen, "Skin Lesion Analysis Towards Melanoma Detection using Deep Learning Network.," *Sensors*, vol. 18, no. 2, p. 556, 2018.

[14] D. Kaymak, S., Helwan, A., & Uzun, "Breast Cancer Image Classification using Artificial Neural Networks.," *Procedia computer science*, vol. 120, pp. 126–131, 2017.

[15] Y. Xu, Y. Wang, J. Yuan, Q. Cheng, X. Wang, and P. L. Carson, "Medical Breast Ultrasound Image Segmentation by Machine Learning," *Ultrasonics*, vol. 91, pp. 1–9, 2019.

[16] X. Wang, H. Chen, C. Gan, H. Lin, Q. Dou, Q. Huang, M. Cai, and P. A. Heng, "Weakly Supervised Learning for Whole Slide Lung Cancer Image Classification," *Medical Imaging with Deep Learning*, 2018.

[17] S. Makaju, P. W. C. Prasad, A. Alsadoon, A. K. Singh, and A. Elchouemi, "Lung Cancer Detection using CT Scan Images," *Procedia Computer Science*, vol. 125, pp. 107–114, 2018.

[18] T. Perumal, S., & Velmurugan, "Lung Cancer Detection and Classification on CT Scan Images using Enhanced Artificial Bee Colony Optimization.," *International Journal of Engineering and Technology*, vol. 7, no. 2.26, pp. 74–79, 2018.

[19] G. Saranya, S. S. Thasny, and K. Sobhia, "Parallel Implementation of Wound Image Analysis System for Diabetic Patient," *International Journal of Innovative Research in Science, Engineering and Technology*, vol. 5, no. 11, pp. 112–118, Jan. 2017.

[20] C. V. Kumar and V. Malathy, "Image Processing Based Wound Assessment System for Patients with Diabetes using Six Classification Algorithms.," in *2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)*, 2016, pp. 744–747.

[21] P. Kumar and B. Vijayakumar, "Brain Tumour Mr Image Segmentation and Classification using by PCA and RBF Kernel Based Support Vector Machine," *Middle-East Journal of Scientific Research*, vol. 23, no. 9, pp. 2106–2116, 2015.

[22] H. Byale, G. M. Lingaraju, and S. Sivasubramanian, "Automatic Segmentation and Classification of Brain Tumor using Machine Learning Techniques," *International Journal of Applied Engineering Research*, vol. 13, no. 14, pp. 11686–11692, 2018.

[23] S. Basheera and M. S. S. Ram, "Classification of Brain Tumors Using Deep Features Extracted Using CNN," in *Journal of Physics: Conference Series*, 2019, vol. 1172, no. 1, p. 012016.

[24] B. Sabeena and P. Raj Kumar, "Diagnosis and Detection of Skin Burn Analysis Segmentation in Colour Skin Images," *International Journal of Advanced Research in Computer and Communication Engineering ISO Certified*, vol. 6, no. 2, pp. 369–374, 2017.

[25] B. Acha, C. Serrano, and L. Roa, "Segmentation and Classification of Burn Color Images," in *Proceedings of the 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2001, vol. 3, pp. 2692–2695.

[26] J. J. Koenderink, "The Structure of Images," *Biological cybernetics*, vol. 50, no. 5, pp. 363–370, 1984.

[27] C. Serrano, B. Acha, and J. I. Acha, "Segmentation of Burn Images Based on Color and Texture Information," in *Proceedings of the SPIE 5032 of Medical Imaging 2003: Image Processing*, 2003, vol. 5032, pp. 1543–1551.

[28] B. Acha, C. Serrano, and J. I. Acha, "Segmentation of Burn Images Using the L*u*v* Space and Classification of Their Depths by Color and Texture Information," *Medical Imaging 2002: Image Processing*, pp. 1508–1515, 2002.

[29] B. Acha, C. Serrano, J. I. Acha, and L. M. Roa, "Segmentation and Classification of Burn Images by Color and Texture Information," *Journal of Biomedical Optics*, vol. 10, no. 3, pp. 34014–3401411, 2005.

[30] C. Serrano, B. Acha, T. Gómez-Cía, J. I. Acha, and L. M. Roa, "A Computer Assisted Diagnosis Tool for the Classification of Burns by Depth of Injury," *Burns*, vol. 31, no. 3, pp. 275–281, 2005.

[31] K. Wantanajittikul, S. Auephanwiriyakul, N. Theera-Umpon, and T. Koanantakool, "Automatic Segmentation and Degree Identification in Burn Color Images," in *Proceedings of the 4th 2011 Biomedical Engineering International Conference (BMEiCON)*, 2012, pp. 169–173.