IJARSCT

ISSN (Online) 2581-9429

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 2, Issue 8, June 2022

Impact Factor: 6.252

Road Pothole Detection

Saurabh Hanwate[1], Akash Patil[2], Tilak Nirgude[3], Prof. T. R. Patil[4]

Students, Department of Information Technology, NBN Sinhgad School of Engineering, Pune[1,2,3]

Guides, Department of Information Technology, NBN Sinhgad School of Engineering, Pune[4]

Abstract: *Highways and roads are arguably the most used forms of transportation in our day and age and their safety and condition is very important. While Image Processing for maintenance and detection in the transportation field has gained popularity over the last half-century thanks to development in technological areas, there is still more that we can learn and apply as Image Processing is still not utilized in this field to its fullest. The aim of this study was to explain Image Processing techniques and how it can be utilized in a multitude of scenarios in highway and road maintenance. This study describes Image Processing as a whole and continues with how Image Processing is used in the detection and maintenance of the following: Potholes, Rutting of Asphalt Terrain, Pavement Cracks and Surface Roughness which are hazards when it comes to road and highways. In addition, the effectiveness of these methods is explored and evaluated through research and comparison of the methods at hand, with attention towards accuracy and precision. Results showed promising views on the usage of Image Processing in these fields, as a generally easy and cost-effective way. Results are discussed and compared individually for each part where a different scenario or method is at hand.*

Keywords: Machine Learning, Pathole, CNN, IOT, etc.

REFERENCES

[1] Sattar S., Li S., & Chapman M., Road surface monitoring using smartphone sensors: A review, Sensors, 18(11), 2018,3845, doi: https://doi.org10.3390/s18113845

[2] Chambon S., & Moliard J.M., Automatic Road pavement assessment with image processing: review and comparison, International Journal of Geophysics, 2011, 2011, 1-20, doi: 10.1155/2011/989354.

[3] Zhang W., Zhang Z., Qi D., & Liu Y., Automatic crack detection and classification method for subway tunnel safety monitoring, Sensors, 14(10), 2014, 19307-19328, doi: https://doi.org/10.3390/s141019307.

[4] Teomete E., Amin V. R., Ceylan H., & Smadi O., Digital image processing for pavement distress analyses, Proceedingsof the Mid-Continent Transportation Research Symposium, 2005, 13

[5] Fukui H., Takagi J., Murata Y., & Takeuchi M., An image processing method to detect road surface condition using optical spatial frequency, Proceedings of Conference on Intelligent Transportation Systems, 1997, 1005-1009, doi: 10.1109/ITSC.1997.660611 Ata Ünlü

[6] Mandal M., Katageri M., Gandhi M., Koregaonkar N., & Sengupta S., Automated management of pothole related disasters using image processing and geotagging, Int. J. Comput. Sci. Inf. Technol, 7(6), 2015, 97-106, doi: 10.5121/ijcsit.2015.7608.

[7] Gao M., Wang X., Zhu S., & Guan P., Detection and segmentation of cement concrete pavement pothole based on image processing technology, Mathematical Problems in Engineering, 2020, doi: https://doi.org/10.1155/2020/1360832.

[8] Buza E., Omanovic S., & Huseinovic A., Pothole detection with image processing and spectral clustering, in Proceedings of the 2nd International Conference on Information Technology and Computer Networks, 810, 2013, 4853.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 8, June 2022
Impact Factor: 6.252

[9] Nienaber S., Booysen M. J., & Kroon R. S., Detecting potholes using simple image processing techniques and real- world footage, 2015.

[10] Vigneshwar K., & Kumar B. H., Detection and counting of pothole using image processing techniques, In 2016 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), 2016, 1-4, doi: 10.1109/ICCIC.2016.7919622. Moomtaz Dahir Mallim.

[11] Sefidmazgi, N. R., Tashman, L., & Bahia, H., Internal structure characterization of asphalt mixtures for rutting performance using imaging analysis, Road Materials and Pavement Design, 2012, 13:sup1, 21-37, doi: https://doi.org/10.1080/14680629.2012.657045.

[12] Chaturabong P., & Bahia H.U., Mechanisms of asphalt mixture rutting in the dry Hamburg Wheel Tracking test and the potential to be alternative test in measuring rutting resistance, Construction and Building Materials, 146, 2017, 175-182.doi: https://doi.org/10.1016/j.conbuildmat.2017.04.080.

[13] Coleri E., Harvey, J.T., Yang, K., & Boone J.M., A micromechanical approach to investigate asphalt concrete rutting mechanisms, Construction and Building Materials, 30, 2012, 36-49, doi: https://doi.org/10.1016/j.conbuildmat.2011.11.041.

[14] Li Q., Yang H., Ma X., & Ni F., Evaluation of microstructure and damage evolution for asphalt pavements in an advanced repeated load permanent deformation test using X-ray computed tomography, Road Materials and Pavement Design, 18(5), 1135-1158, doi: https://doi.org/ 10.1080/14680629.2016.1207555.

[15] Coleri E., Kayhanian M., Harvey J.T, Yang K., Boone J.M., Clogging evaluation of open graded friction course pavements tested under rainfall and heavy vehicle simulators, Journal of environmental management, 129, 2013, 164-172,doi: https://doi.org/10.1016/j.jenvman.2013.07.005 Mahmut Yurt

[16] Xu G., Ma J., Liu F., & Niu X., Automatic recognition of pavement surface crack based on BP neural network, In 2008 International Conference on Computer and Electrical Engineering, 2008, 19- 22, doi: 10.1109/ICCEE.2008.96.

[17] Yusof N. A. M., Osman M. K., Noor M. H. M., Ibrahim A., Tahir N. M., & Yusof N. M., Crack detection and classification in asphalt pavement images using deep convolution neural network, in 2018 8th IEEE International Conference on Control System, Computing and Engineering (ICCSCE), 2018, 227-232, doi:10.1109/ICCSCE.2018.8685007.

[18] Lee B. J., & Lee H. D., Position□invariant neural network for digital pavement crack analysis, Computer□Aided Civil and Infrastructure Engineering, 19(2), 2004, 105-118, doi: https://doi.org/10.1111/j.1467-8667.2004.00341.x.

[19] Shatnawi N., Automatic Pavement Cracks Detection using Image Processing Techniques and Neural Network, INTERNATIONAL JOURNAL OF ADVANCED COMPUTER SCIENCE AND APPLICATIONS, 9(9), 2018, 399-402.

[20] Li B., Wang K. C., Zhang A., Yang E., & Wang G., Automatic classification of pavement crack using deep convolutional neural network, International Journal of Pavement Engineering, 21(4), 2020, 457-463, doi: https://doi.org/10.1080/10298436.2018.1485917 Efe Ekinci

[21] Dodds C. J., & Robson J. D., The description of road surface roughness, Journal of sound and vibration, 31(2), 1973,175-183, doi: https://doi.org/10.1016/S0022-460X(73)80373-6

[22] Tang X.I.A.O.J.U.N., Xiao H., Ding H., & Liu J.U.N.H.U.A., Surface roughness measurement based on imageprocessing and image recognition, Computers and simulation in modern science, 2009, 91-96.

[23] Kertesz I., Lovas T., & Barsi A., Measurement of road roughness by low-cost photogrammetric system, International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 36(5/C55), 2007, 4.

[24] Yuan Z., Zhang X., Liu S., Han X., & Du Y, Laser line recognition for autonomous road roughness

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 8, June 2022
Impact Factor: 6.252

measurement, In 2015 IEEE International Conference on Cyber Technology in Automation, Control, and Intelligent Systems (CYBER), 2015, 436-440, doi: 10.1109/CYBER.2015.7287977

[25] Bello-Salau H., Aibinu A. M., Onwuka E. N., Dukiya J. J., & Onumanyi A. J., Image processing techniques for automated road defect detection: A survey, In 2014 11th International Conference on Electronics, Computer and Computation (ICECCO), 2014, 1-4, doi: 10.1109. 802.11, 1997.