IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, December 2023

Forecasting Crop Yield For Sustainable Agriculture

Sakshi Mundhe[1], Jitu Sanap[2], Pooja Jadhav[3], Vaishnavi Kalsadkar[4], Prof. Chiranjit Das[5]
Students, Department of Data Science[1,2,3,4]
Faculty, Department of Data Science[5]
G. H. Raisoni College of Engineering and Management, Wagholi, Maharashtra, India

Abstract: *Forecasting crop yield prediction is an very important decision support tool. Crop yield prediction is the process of using data and technology to estimate how much agricultural produce, such as crops, will be harvested in a specific area for a given period. This involves analyzing various factors like weather patterns, soil quality, historical data, and farming practices to make educated guesses about the future harvest. It helps farmers, policymakers, and food supply chain stakeholders make informed decisions regarding planting, resource allocation, and food security. Essentially, it's like forecasting the future of crop production to ensure efficient and sustainable agriculture.*

Forecasting crop yield is a complex and vital endeavor in modern agriculture, aiming to foresee the quantity of crops that will be harvested in a specific area during a particular growing season. This process relies on a synergy of data-driven analysis, technological advancements, and the integration of various factors that influence crop growth and productivity. In essence, it involves the art and science of anticipating nature's bounty, allowing us to make informed decisions, enhance food security, and optimize resource allocation.

Keywords: Forecasting crop yield, Decision support system, Systematic literature review, Machine learning

REFERENCES

[1] Ahamed, A.T.M.S., Mahmood, N.T., Hossain, N., Kabir, M.T., Das, K., Rahman, F., Rahman, R.M., 2015. Applying data mining techniques to predict annual yield of major crops and recommend planting different crops in different districts in Bangladesh. In: 2015 IEEE/ACIS 16th International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing, SNPD 2015 - Proceedings, https://doi.org/10.1109/SNPD.2015.7176185

[2] Ahmad, I., Saeed, U., Fahad, M., Ullah, A., Habib-ur-Rahman, M., Ahmad, A., Judge, J., 2018. Yield forecasting of spring maize using remote sensing and crop modeling in Faisalabad-Punjab Pakistan. J. Indian Soc. Remote Sens. 46 (10), 1701–1711. https://doi.org/10.1007/s12524-018-0825-8..

[3] Ayodele, T.O., 2010. Introduction to Machine Learning.Baldi,P.,2012.Autoencoders, unsupervised learning, and deep architectures. In: Proceedings of ICML workshop on unsupervised and transfer learning, pp. 37–49. Baral, S., Kumar Tripathy, A., Bijayasingh, P., 2011.Yield Prediction Using Artificial Neural Networks, pp. 315–317. https://doi.org/10.1007/978-3-642-19542-6_57

[4] Bargoti, S., Underwood, J.P., 2017. Image segmentation for fruit detection and yield estimation in apple orchards. J. Field Rob. 34 (6), 1039–1060. https://doi.org/10. 1002/rob.21699

[5] Beulah, R., 2019. A survey on different data mining techniques for crop yield prediction. Int. J. Comput.Sci.Eng.7(1),738–744. https://doi.org/10.26438/ijcse/v7i1.738744.

Bhojani, S.H., Bhatt, N., 2020. Wheat crop yield prediction using new activation functions in neural network. Neural Comput. Appl. 1–11.

[6] Cheng, H., Damerow, L., Sun, Y., Blanke, M., 2017. Early yield prediction using image analysis of apple fruit and tree canopy features with neural networks. J. Imag. 3 (1), 6. https://doi.org/10.3390/jimaging3010006.

[7] Crane-Droesch, A., 2018. Machine learning methods for crop yield prediction and climate change impact assessment in agriculture. Environ. Res. Lett. 13 (11), 114003. https://doi.org/10.1088/1748-9326/aae159

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, December 2023

[8] Everingham, Y., Sexton, J., Skocaj, D., Inman-Bamber, G., 2016. Accurate prediction of sugarcane yield using a random forest algorithm. Agron. Sustainable Dev. 36 (2). https://doi.org/10.1007/s13593-016-0364-z.
[9] Fernandes, J.L., Ebecken, N.F.F., Esquerdo, J.C.D.M., 2017. Sugarcane yield prediction in Brazil using NDVI time series and neural networks ensemble. Int. J. Remote Sens. 38 (16), 4631–4644. https://doi.org/10.1080/01431161.2017.1325531.
[10] Filippi, P., Jones, E.J., Wimalathunge, N.S., Somarathna, P.D.S.N., Pozza, L.E., Ugbaje, S.U., Bishop, T.F.A., 2019a. An approach to forecast grain crop yield using multilayered, multi-farm data sets and machine learning. Precis. Agric. 1–15. https://doi. org/10.1007/s11119-018-09628-4.
[11] Gandhi, N., Armstrong, L., 2016. Applying data mining techniques to predict yield of rice in humid subtropical climatic zone of India. In: Proceedings of the 10th INDIACom; 2016 3rd International Conference on Computing for Sustainable Global Development, INDIACom 2016, 1901–1906. Retrieved from https://ieeexplore.ieee.org/abstract/document/7724597/.
[12] Girish, L., Gangadhar, S., Bharath, T., Balaji, K., n.d. Crop Yield and Rainfall Prediction in Tumakuru District using Machine Learning. Ijream.Org. Retrieved from https:// www.ijream.org/papers/NCTFRD2018015.pdf
[13] Kashif Mehboob, Junaid Arshad and Muhammad Mubashir Khan January 2018 Secure digital voting system based on Blockchain technology Int. J. of Electronic Government Research 14(1) pp 53-62. https://core.ac.uk/download/pdf/155779036.pdf
[14] Noor Mohammedali and Ali Al-Sherbaz 2019 Election system based on Blockchain technology Int. J. of Computer Science & Information Technology (IJCSIT) 11, No 5 pp 13-31. https://aircconline.com/ijcsit/V11N5/11519ijcsit02.pdf
[15] Archit Pandey, Mohit Bhasi and K Chandrasekaran 2019 VoteChain: A Blockchain based e-voting system Global Conf. for Advancement in Technology (GCAT) (Bangaluru: India) pp 1-4. https://ieeexplore.ieee.org/document/8978295
[16] Clement Chan Zheng Wei and Chuah Chai Wen 2018 Blockchain-based electronic voting protocol Int. J. on Informatics Visualization 2 pp 336- 341. http://doi.org/10.30630/joiv.2.4-2.174
[17] Haibo Yi 2019 Securing e-voting based on blockchain in P2P network J. on Wireless Communications and Networking (EURASIP). https://doi.org/10.1186/s13638-019-1473-6
[18] Freya Sheer Hardwick, Apostolos Gioulis, Raja Naeem Akram and Konstantinos Markantonakis 2018 E-voting with Blockchain: An e-voting protocol with decentralization and voter privacy Int. Conf. on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData) (Ghaziabad: India). https://ieeexplore.ieee.org/document/8777471
[19] Ahmed Ben Ayed 2017 A conceptual secure Blockchain-based electronic voting system Int. J. of Network Security & Its Applications (IJNSA) 9, No.3.
[20] Shah, A., Dubey, A., Hemnani, V., Gala, D., Kalbande, D.R., 2018. Smart Farming System: Crop Yield Prediction Using Regression Techniques. Springer, Singapore, pp. 49–56. https://doi.org/10.1007/978-981-10-8339-6_6.
[21] Shekoofa, A., Emam, Y., Shekoufa, N., Ebrahimi, M., Ebrahimie, E., 2014. Determining the most important physiological and agronomic traits contributing to maize grain yield through machine learning algorithms: a new avenue in intelligent agriculture. PLoS ONE 9 (5), e97288. https://doi.org/10.1371/journal.pone.0097288.
[22] Shidnal, S., Latte, M.V., Kapoor, A., 2019. Crop yield prediction: two-tiered machine learning model approach. Int. J. Inf. Technol. 1–9.
[23] Šmite, D., Wohlin, C., Gorschek, T., Feldt, R., 2010. Empirical evidence in global software engineering: a systematic review. Empirical Softw. Eng. 15 (1), 91–118. https://doi. org/10.1007/s10664-009-9123-y.
[24] Somvanshi, P., Mishra, B.N., 2015. Machine learning techniques in plant biology. In: PlantOmics: The Omics of Plant Science. Springer India, New Delhi, pp. 731–754. https://doi.org/10.1007/978-81-322-2172-2_26.
[25] Su, Y.X., Xu, H., Yan, L.J., 2017. Support vector machine-based open crop model (SBOCM): case of rice production in China. Saudi J. Biol. Sci. 24 (3), 537–547.
[26] Ahamed, A. M. S., Mahmood, N. T., Hossain, N., Kabir, M. T., Das, K., Rahman, F., & Rahman, R. M. (2015, June). Applying data mining techniques to predict annual yield of major crops and recommend planting different crops

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, December 2023

in different districts in Bangladesh. In 2015 IEEE/ACIS 16th International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD) (pp. 1-6). IEEE.
[27] Shastry, A., Sanjay, H. A., & Hegde, M. (2015, June). A parameter based ANFIS model for crop yield prediction. In 2015 IEEE International Advance Computing Conference (IACC) (pp. 253-257). IEEE
[28] Veenadhari, S., Misra, B., & Singh, C. D. (2014, January). Machine learning approach for forecasting crop yield based on climatic parameters. In 2014 International Conference on Computer Communication and Informatics (pp. 1-5). IEEE.
[29] Molden, D.; Vithanage, M.; de Fraiture, C.; Faures, J.M.; Gordon, L.; Molle, F.; Peden, D. Water Availability and Its Use in Agriculture. Treatise Water Sci. 2011, 4, 707–732. [CrossRef].
[30] EastAfrican. 3000 Rwandan Families Face Hunger due to Drought—Rwanda|ReliefWeb, (n.d.). Available online: https://reliefweb.int/report/rwanda/3000-rwandanfamilies-face-hunger-due-drought (accessed on 3 February 2022).
[31] Kironde, E.G. Rwanda State of Environment and Outlook Report. In REMA; 2016; 1, pp. 93–115.Available online: https://www.rema.gov.rw/soe/chap9.php (accessed
[32] Chakraborty, D.; Saha, S.; Sethy, B.K.; Singh, H.D.; Singh, N.; Sharma, R.; Chanu, A.N.; Walling, I.; Anal, P.R.; Chowdhury, S.; et al. Usability of the Weather Forecast for Tackling Climatic Variability and Its Effect on Maize Crop Yield in Northeastern Hill Region of India. Agronomy 2022, 12, 2529. [CrossRef
[33] The Internet of Things Applications for Challenges and Related Future Technologies & Development Mritunjay Kumar1, Km Annoo2, Raman Kumar Mandal3 https://scholar.google.com/citations?view_op=view_citation &hl=en&user=IRSdLtMAAAAJ&citation_for _view=IRSdLtMAAAAJ:u5HHmVD_uO8
[34] Characteristics of Research Process and Methods for Web-based Research Support Systems Mritunjay Kumar, Km Annoo, Harish Chandra Maurya https://scholar.google.com/citations?view_op=view _citation&hl=en&user=IRSdLtMAAAAJ&citation _for_view=IRSdLtMAAAAJ:d1gkVwhDpl0C
[35] Security of Internet of Things of Application, Challenges and Related Future Technologies Prabhanjan Kumar, Sneha Mishra, Mritunjay Kumar, Arjit Tomar, Jayati Mukherjee hΣps://scholar.google.com/citaΘons?view_ op=view_citaΘon&hl=en&user=IRSdLtMAAAAJ&citaΘon _for_view=IRSdLtMAAAAJ:738O_yMBCRsC