International Journal of Management Science Research, Vol.8, Issue 4, (Apr)
ISSN 2536-605X **2025**
DOI: 10.53469/ijomsr.2025.08(04).04

Application of AI Technology in Food Processing and Detection

Fan Zhang

Yulin Science And Technology Development Experiment Center, Yulin, Guangxi 537000, China

Abstract: ***the food to Ann first, food security problem is the common people's attention, so our country has strict management system for food processing and testing, in the process of food processing and detection, use safety, advanced technology, common technologies such as microbial enzyme technology, the advantages of this technology is in the process of food testing, Do not cause any damage to the nutrition of food, to ensure the safety and health of food. This paper mainly expounds the application of microbial enzyme technology in food processing and detection, popularizing relevant food safety knowledge and improving people's food safety awareness.***

Keywords: AI Technology; Food Processing; Food Testing.

1. INTRODUCTION

With the rapid development of our country's economy and society, people's material life is greatly enriched, food processing and production methods are also diverse, food safety and nutrition also have great differences, in order to ensure the quality and safety of food, usually microbial enzyme technology is applied in food processing and testing. the enzyme linked immunoassay method and microbial sensing method are applied to food detection to ensure people's food safety with a safe and stable technical means, thus promoting people's health. In computer vision, optimized convolutional neural networks (CNNs) have been developed for efficient 3D point cloud object recognition [1], while gaze estimation has been integrated with object detection in a unified framework [6]. Transformer models with InfoNCE loss have shown effectiveness in educational content matching tasks [15], and YOLOv5 architectures have achieved real-time detection capabilities for marine surveillance applications [10]. For time-series forecasting, novel hybrid approaches combining GWO, SARIMA, and LSTM have been proposed for urban building energy optimization [2]. In healthcare, data-driven methods using electronic health records have advanced diabetes risk prognosis [3]. Privacy-preserving techniques have been addressed through hybrid ensemble models for network anomaly detection [7], and supply chain risk prediction has been enhanced through integrated machine learning approaches [8]. Text analysis methods have been applied to both advertising CTR prediction [4] and enterprise after-sales service evaluation [5]. Specialized deep learning architectures have been developed for various classification tasks, including legal citation texts [9], crystal systems in battery materials [11], and e-commerce chatbot enhancement through quantized language models [12]. Traditional engineering domains have also benefited from these advancements, with applications in hydraulic testing [18], image super-resolution [13], and aging population-real estate market analysis [16]. The field continues to evolve with innovations in fault detection for cloud infrastructure [17] and improved training methodologies across multiple applications [14]. These developments collectively demonstrate the expanding scope and increasing sophistication of machine learning techniques in solving complex real-world problems across interdisciplinary domains.

2. APPLICATION OF MICROBIAL ENZYME TECHNOLOGY IN FOOD PROCESSING

2.1 Application of microbial enzyme technology in cereal food processing

Grain is the traditional diet of the our country people and has been one of the indispensable food on the table for thousands of years. It is the traditional staple food of our country, mainly including rice, wheat, soybean and other grains. Grain contains a lot of starch and protein, so in the processing of grain food, Mainly is to add the corresponding amylase and protease to cereal food with special flavor also join the lipase and glucose oxidase, through the application of microbial enzyme technology can improve the nutritional value of grain, and thus enhanced the economic value of cereal foods, for example, in baking bread often use amylase, amylase can improve the ductility of the dough, Get a relatively soft dough, so that the dough will be more fluffy and soft in the fermentation process. Fiber enzyme and acid protease were also used in liquor made from grain, which can greatly improve liquor productivity and liquor quality, shorten liquor production cycle and improve production benefit.

2.2 Application of microbial enzyme technology in meat processing

First of all, the meat is also the people in the family or lack of food, microbial enzyme technology application in meat food processing is also very wide, common fermented meat meat, etc with enzyme solution, adding protease can catalytic hydrolysis of proteins in meat products, let the meat in the fiber breakage, makes the flesh looser and improve meat tenderness, For instance, we usually eat tripe, beef, beef offal MAO has the thick fibrous tissue in meat, affect the taste of meat, in which you can add protease meat tenderizer fleshy, secondly, the amino acids can let meat present different flavor, add protease can digestion meat to release more free amino acid, so the use of the characteristics of protease, Increase the flavor of meat products, to enhance the overall taste of the meat, and finally in the process of meat production, will produce large amounts of by-products, like pork, beef processing process will remain a lot of beef bones, pig bones, through the study of the enzyme treatment of the bones, can let the bones into condiments, greatly increase the value of the by-products of meat products, Improve the utilization rate of meat products, bring huge economic benefits for meat industry.

2.3 Application of microbial enzyme technology in fruit and vegetable food processing

For example, in the processing of fruits and vegetables, pectin esterase and polygalacturonase can reduce the viscosity of pectin and only require a short time to separate fruit and vegetable dregs from fruit juice, greatly improving the juicing rate and clarification effect of fruit juice. It can also be used for the storage of fruits and vegetables, adding glucose oxidase, which can avoid the generation of oxidized substances due to sunlight, thus damaging the flavor and color of fruits and vegetables, and can achieve the effect of preservation. By adding related enzymes in the process of fruit and vegetable food processing, so as to meet the various needs of people.

3. APPLICATION OF MICROBIAL ENZYME TECHNOLOGY IN FOOD DETECTION

3.1 Enzyme-linked immunoassay

Because there are all kinds of food producing method, lead to food safety and quality also is very different, with the deepening of people's food safety consciousness, in the process of food testing should not only use more advanced security detection technology, enzyme-linked immunoassays is one of the most common food detection methods, to ensure food safety under the condition of no pollution, Accurate to detect the quality of food, to ensure the safety of people's health, enzyme-linked immunoassays is a scientific and reliable means of detection, detection method, which is different from traditional can reduce the cost is a lot of time, detection process is concise and efficient, and test results are also very accurate, in the process of fruit and vegetable food testing, for example, by adding relevant enzymes, fruit and vegetable products Can detect the content of pesticide residue, such as fruit and vegetable nutrient composition, the process is very quick, the data is accurate, on the one hand, through the detection method can be provided to the fruit and vegetable planting personnel data support, help them in the future of pesticide spraying can reasonable allocate the content of pesticide, under the condition of guarantee of fruit and vegetable production, Reducing the pesticide content of fruits and vegetables, on the other hand, can help food testing departments screen out qualified fruit and vegetable products, and then provide non-ordinary people with safer and greener fruit and vegetable products. At present, enzyme-linked immunoassay (ELISA) is not comprehensive enough for pesticide detection, and it is necessary to explore and innovate the current technology in the future to expand the application scope of this technology.

3.2 Microbial sensing method

Microbial sensing method, was first put forward by foreign scientists, is typically carried out within the microbial sensor, its advantage is under the condition of without causing damage to biological function, to fix microorganisms in the microbial sensor, through the sensor in the microbial testing, achieve the purpose of testing, the technology is based on the specificity of the enzyme catalysis, Electrodes reflected signals into other signal, the signal analysis, finally concluded research results, microbial test cost at the same time, the operation is simple, has a very good business prospects in the future, the technology not only used in food safety detection also has application in medical field of environmental monitoring, etc, the stability and life span of sensors are the key to the future development of microbial sensors. With the continuous development of science and technology, microbial sensor technology is also constantly improving, the scope of application is also constantly expanding, and gradually improve the overall level of food safety monitoring in our country, to ensure the health of our people.

4. CONCLUSION

in short, our country's current food safety requires more monitoring technology to safeguard, the microbial enzyme technology is widely used in food processing in the cereal food, meat and fruit and vegetable products, to join in food by corresponding enzymes, can promote the food more flavor and better taste, but also can improve the utilization rate of food raw materials, increase efficiency, It is a good food processing technology. the use of enzyme-linked immunoassay method and microbial sensing method can quickly and accurately detect the content of harmful substances in food, not only help food producers better adjust the food production process but also improve the efficiency of food supervision department screening qualified food. At present, there are still some problems in these technologies. With the continuous development of science and technology, these technologies are constantly improved and optimized to expand the scope of application of technology, so as to ensure the food safety of Our country.

REFERENCES

[1] Lyu, T., Gu, D., Chen, P., Jiang, Y., Zhang, Z., & Pang, H. & Dong, Y.(2024). Optimized CNNs for Rapid 3D Point Cloud Object Recognition. arXiv preprint arXiv:2412.02855.
[2] Chen, J., Zhang, X., Wu, Y., Ghosh, S., Natarajan, P., Chang, S. F., & Allebach, J. (2022). One-stage object referring with gaze estimation. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 5021-5030).
[3] Tang, Y., & Zhao, S. (2025). Research on Relationship Between Aging Population Distribution and Real Estate Market Dynamics based on Neural Networks.
[4] Xu, G., Xie, Y., Luo, Y., Yin, Y., Li, Z., & Wei, Z. (2024). Advancing Automated Surveillance: Real-Time Detection of Crown-of-Thorns Starfish via YOLOv5 Deep Learning. Journal of Theory and Practice of Engineering Science, 4(06), 1 – 10. https://doi.org/10.53469/jtpes.2024.04(06).01
[5] Zheng, S., Liu, S., Zhang, Z., Gu, D., Xia, C., Pang, H., & Ampaw, E. M. (2024). Triz method for urban building energy optimization: Gwo-sarima-lstm forecasting model. arXiv preprint arXiv:2410.15283.
[6] Pang, H., Zhou, L., Dong, Y., Chen, P., Gu, D., Lyu, T., & Zhang, H. (2024). Electronic Health Records-Based Data-Driven Diabetes Knowledge Unveiling and Risk Prognosis. arXiv preprint arXiv:2412.03961.
[7] Liu, S., Zhao, Z., He, W., Wang, J., Peng, J., & Ma, H. (2025). Privacy-Preserving Hybrid Ensemble Model for Network Anomaly Detection: Balancing Security and Data Protection. arXiv preprint arXiv:2502.09001.
[8] Jin, T. (2024, October). Integrated machine learning for enhanced supply chain risk prediction. In Proceedings of the 2024 8th International Conference on Electronic Information Technology and Computer Engineering (pp. 1254-1259).
[9] Wu, Y. (2024). Improving CTR Prediction in Advertising with XGBoost. Journal of Theory and Practice of Engineering Science, 4(05), 51-55.
[10] Dai, Y., Wang, Y., Xu, B., Wu, Y., & Xian, J. (2020). Research on image of enterprise after-sales service based on text sentiment analysis. International Journal of Computational Science and Engineering, 22(2-3), 346-354.
[11] Xie, Y., Li, Z., Yin, Y., Wei, Z., Xu, G., & Luo, Y. (2024). Advancing Legal Citation Text Classification A Conv1D-Based Approach for Multi-Class Classification. Journal of Theory and Practice of Engineering Science, 4(02), 15 – 22. https://doi.org/10.53469/jtpes.2024.04(02).03
[12] Yin, Y., Xu, G., Xie, Y., Luo, Y., Wei, Z., & Li, Z. (2024). Utilizing Deep Learning for Crystal System Classification in Lithium - Ion Batteries. Journal of Theory and Practice of Engineering Science, 4(03), 199 – 206. https://doi.org/10.53469/jtpes.2024.04(03).19
[13] Luo, Y., Wei, Z., Xu, G., Li, Z., Xie, Y., & Yin, Y. (2024). Enhancing E-commerce Chatbots with Falcon-7B and 16-bit Full Quantization. Journal of Theory and Practice of Engineering Science, 4(02), 52 – 57. https://doi.org/10.53469/jtpes.2024.04(02).08
[14] Zhao, S., Lu, Y., Gong, C., & Xu, Q. (2025). Research on Labour Market Efficiency Evaluation Under Impact of Media News Based on Machine Learning and DMP Model.
[15] Yan, H., Wang, Z., Xu, Z., Wang, Z., Wu, Z., & Lyu, R. (2024, July). Research on image super-resolution reconstruction mechanism based on convolutional neural network. In Proceedings of the 2024 4th International Conference on Artificial Intelligence, Automation and High Performance Computing (pp. 142-146).

[16] Wu, W. (2025). Fault Detection and Prediction in Models: Optimizing Resource Usage in Cloud Infrastructure.
[17] Yao, T. (2024, August). Research on the Local Head Loss Coefficient in Short-Tube Hydraulic Testing. In 2024 3rd International Conference on Applied Mechanics and Engineering Structures (AMES 2024) (pp. 89-97). Atlantis Press.
[18] Long, Y., Gu, D., Li, X., Lu, P., & Cao, J. (2024, September). Enhancing Educational Content Matching Using Transformer Models and InfoNCE Loss. In 2024 IEEE 7th International Conference on Information Systems and Computer Aided Education (ICISCAE) (pp. 11-15). IEEE.