



Research Proposal: Analysis of Cancer-Causing Ingredients in Food Products Through Barcode Scanning

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August 14, 2024

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Project Overview

The proposed research aims to develop an innovative barcode scanning algorithm that analyzes food product ingredients to identify potential cancer-causing agents. By leveraging machine learning techniques and an extensive database of harmful substances, the system will classify ingredients based on their health implications and provide real-time safety assessments to consumers.

Subject

Computer Vision, Computer Science, and Machine Learning

Ref ID

OMO/RE/138

Problem

The prevalence of harmful ingredients in food products, particularly coloring agents, poses a serious health risk. For example, food dyes such as Red 40 and Yellow 5 have been linked to cancer in various studies. These artificial dyes are commonly found in a wide range of consumer products, leading to widespread exposure. The lack of public awareness around these risks underscores the need for a technological solution to monitor and inform consumers about potentially harmful additives in food items.

Importance of Solving Given Problem

Addressing this problem is crucial for public health, enabling consumers to make informed choices and potentially reducing cancer risks associated with certain food products. Implementing this sys-

tem could significantly lower the risks of consuming products with harmful ingredients, ultimately contributing to better health outcomes and reduced healthcare costs related to cancer treatments.

Research Description

This research will develop an innovative algorithm that scans barcodes to analyze ingredients in food products. The system will extract ingredient data, classify them based on health implications, and identify any known carcinogens by leveraging an extensive database of harmful substances and their safe consumption levels. Machine learning techniques will be utilized to continuously improve the accuracy of ingredient classification and risk assessment over time.

Research Hypothesis

- Specific additives will be identified as having significant carcinogenic properties.
- Structured ingredient analysis can substantially aid in consumer safety measures.

Research Questions

- What is the relationship between food coloring agents and cancer-causing chemicals in food products?
- Which additives pose the greatest risk?

Approach

The research will begin with a comprehensive literature review to gather existing knowledge on harmful food additives. A prototype of the scanning algorithm will then be developed using programming languages like Python. Data input will come from barcode scanning, with the output generating alerts for potentially dangerous ingredients. Collaboration with food safety experts is planned to validate the database and algorithm accuracy.

Prerequisites

- Proficiency in programming languages (e.g., Python, C++)
- Understanding of image processing techniques and Fourier analysis
- Experience with machine learning frameworks (e.g., TensorFlow, PyTorch)

References

1. National Research Council (US) Committee on Diet, Nutrition, and Cancer. Diet, Nutrition, and Cancer: Directions for Research. Washington (DC): National Academies Press (US); 1983. 8, Food Additives, Contaminants, Carcinogens, and Mutagens. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK216714/>
2. "Food Dyes: Harmless or Harmful?", Aug. 14, 2024. [Online]. Available: <https://www.healthline.com/nutrition/dyes>. [Accessed: Aug. 13, 2024]

General Note:

1. The device will be a prototype only and not a final minimum viable product (MVP) or production-grade device, but it will be functional enough to demonstrate the project idea.
2. The software component will be implemented in Python and will not be implemented for iOS or Android devices.

FAQ's

What is a research description?

- A research description outlines the main objectives, methods, and scope of a study. It serves as a comprehensive overview of the research project, helping you to understand what the study aims to achieve and how it plans to do so.

What is a research hypothesis?

- A research hypothesis is a specific, testable prediction about what you expect to happen in your study. It is based on knowledge, theory, and research related to the topic and directs the focus of the study.

What is a research question?

- Research questions are the questions around which you center your research. They should be clear, focused, and researchable within the constraints of your project.

What if I don't fulfil all the prerequisites?, Can I still Continue?

- Yes, you can continue with the idea; just let your mentor know beforehand, and they will guide you with the required skills.

What are the time commitments I will need to give for research?

- The program requires a commitment of 30 hours over a period of 4 months. This allows for a well-paced and immersive research experience without overwhelming your academic schedules.
- In case there is no experience of TECH / Analysis, then the student needs to allocate 20 hours for skilling as well.
- All sessions for Research and Skilling are aligned one-on-one with mentor
- Sessions are one-on-one with the mentor assigned to you. Ideally, the sessions should be twice a week, and this will ensure you complete the research project in 4 months.
- In case of an exam, health, or personal reasons, you can take a pre-informed break, which will carry forward the time to complete accordingly.

Who will be my mentor?

- Each student will be assigned a dedicated mentor, who is full-time with OMOTEC, and will guide you through every step of the process. All our mentors are qualified engineers. Your mentor will be your partner in exploring and taking your idea to execution, overcoming challenges, and achieving success.