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Measuring The Effectiveness Of Retail Endcaps Using IoT Sensors And Machine Learning

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ABSTRACT

In retail, an endcap is a display for products placed at the end of an aisle. An endcap is believed to give a brand a competitive advantage and is often leased at a premium price. This disclosure describes techniques to measure the effectiveness of retail endcaps by embedding internet-of-things (IoT) sensors, e.g., proximity sensors, within the endcap. Effectiveness is measured, for example, based on factors such as the amount of foot traffic, the amount of time customers dwell on the products displayed in the endcap, etc. Machine learning is used to discern customer behavioral patterns, such that the investment of the retailer in the endcaps is optimized.

KEYWORDS

- Retail endcap
- Proximity sensor
- Machine learning
- Retail sales effectiveness
- Visit-to-purchase ratio

BACKGROUND

In retail, an endcap is a display for products placed at the end of an aisle. An endcap is believed to give a brand a competitive advantage and is often leased at a premium price. Retailers deploy endcaps to showcase products and use them as interaction points to attract customers to learn about a product in the hope of convincing the customer to make a purchase. However, retailers have limited insight at present into how effective an endcap is, e.g., in terms of traffic, engagement, etc.

Retailers have an interest in questions such as the following. Is the endcap well placed? Is there a large traffic? Is there sufficient customer engagement? Is there large traffic but low engagement? If so, why? Is there low traffic but high engagement? However, the answers to such questions are currently not known to any degree of precision.

DESCRIPTION

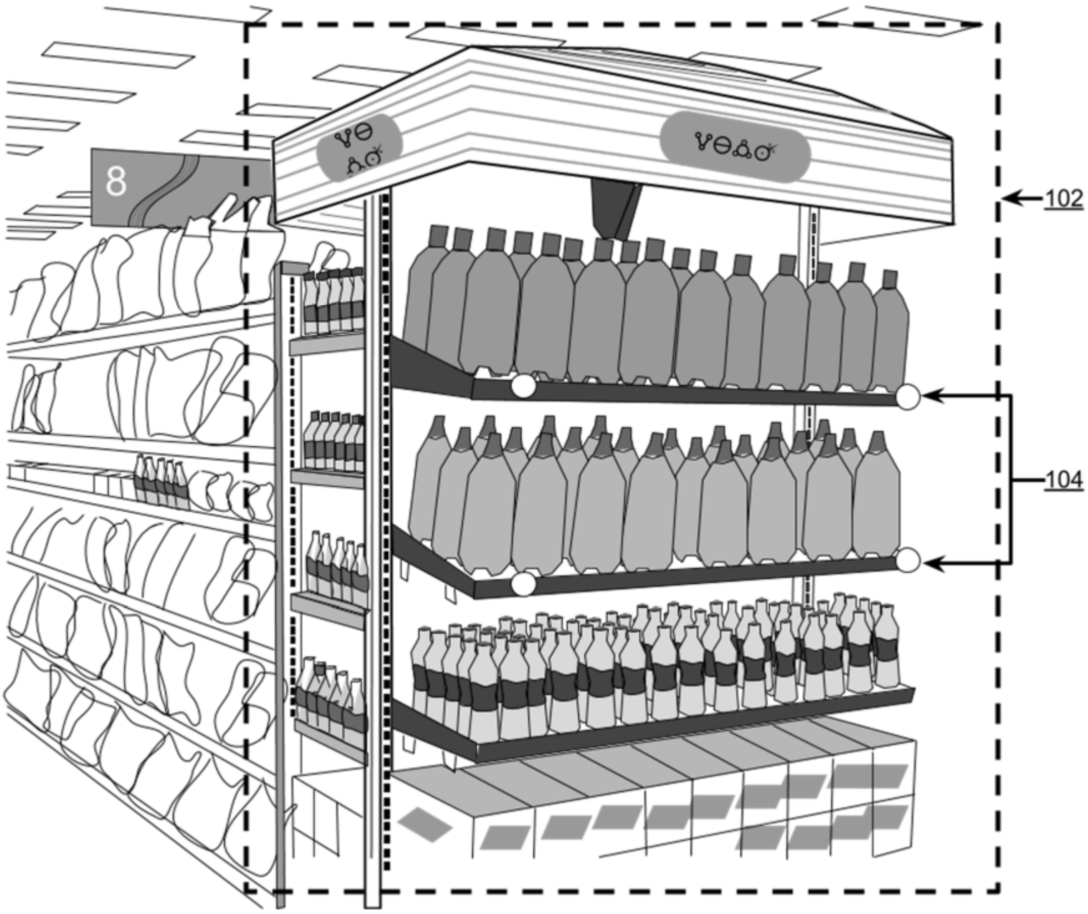

Fig. 1: A retail endcap with embedded sensors

Per the techniques of this disclosure, as illustrated in the example of Fig. 1, the effectiveness of a retail endcap (102) is measured by embedding reusable, low-powered internet-of-things (IoT) sensors (104), e.g., proximity sensors, etc. within the endcap.

The IoT sensors embedded within the endcap measure various parameters such as foot traffic near the endcap, how close a person is to the endcap, how long a person dwells at the endcap, etc. The effectiveness of the endcap can be measured, for example, as total dwell time of customers, total foot traffic, etc. Customer engagement can be measured as the total dwell time, the proximity of the customers to the endcap, etc.

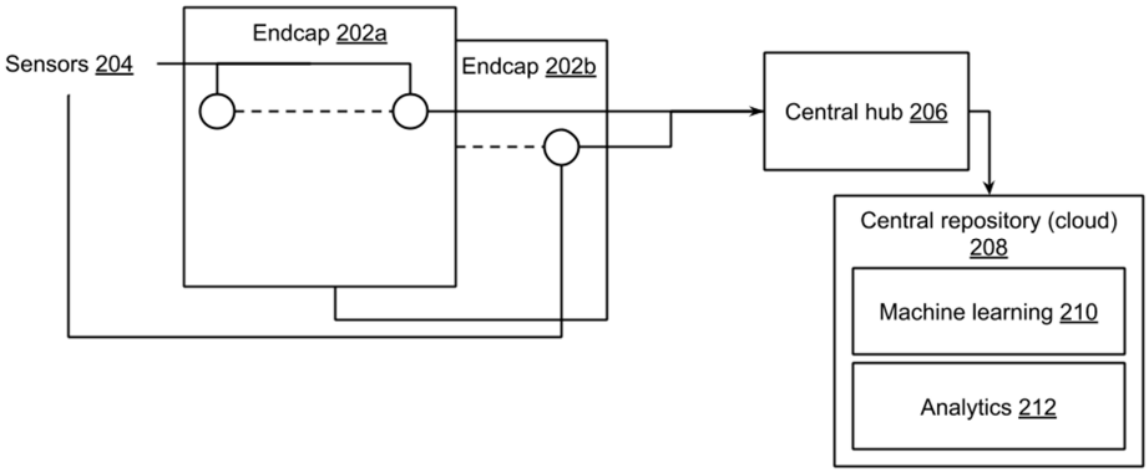

Fig. 2: Measuring endcap effectiveness in retail using IoT sensors and machine learning

In an example implementation, as illustrated in Fig. 2, IoT sensors (204) onboard the endcaps (202a-b) of a store periodically transmit data wirelessly to a central hub (206). The hub in turn forwards received data from sensors to a central repository (208), e.g., using a publish/subscribe (PubSub) technique. Such sensor-origin data is stored in the cloud. The data include can include sensor measurements as well as any metadata that identifies the device, its location, etc.

Trained machine learning (ML) models (210) and analytics studies (212) are run against the data to detect behavioral patterns of the customer as well as anomalies, e.g., low foot traffic during holiday season, clusters of high (or low) performing retail locations and/or endcaps. Findings from machine learning models and/or other analytics modules enable a retailer to make informed decisions regarding the placement of endcaps and the types of endcaps and products that benefit from endcaps. Such findings also provide insight into the causes for differing relative performances of endcaps or retail locations.

A further innovation can involve utilizing cameras to make the endcap responsive to user emotion by using artificial intelligence techniques to gauge facial expressions and automatically adjust the lighting of the endcap, or other responses, to make for a better user experience.

Retail stores or other locations that include endcaps can utilize the described techniques. Customers at such locations are informed that one or more sensors are included in the endcap, e.g., similar to how users are informed about the presence of cameras or other sensors. The locations where endcaps that include sensors are deployed can be marked to indicate the presence of IoT sensors. Data obtained from the sensors can be aggregated for storage.

In the case of endcaps that allow user interaction, say by using a touch screen that can collect user information, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs, or features described herein may enable collection of user information (e.g., information about a user's social network, social actions, or activities, profession, a user's preferences, user's presence near an endcap, user's dwell time at an endcap, user activity, a user's current location), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure describes techniques to measure the effectiveness of retail endcaps by embedding internet-of-things (IoT) sensors, e.g., proximity sensors, within the endcap. Effectiveness is measured, for example, based on factors such as the amount of foot traffic, the amount of time customers dwell on the products displayed in the endcap, etc. Machine learning is used to discern customer behavioral patterns, such that the investment of the retailer in the endcaps is optimized.