



Karna AI

AI Solutions for Market Research



Automated Retail Shelf Monitoring

Using Computer Vision to track shelf presence of brands at scale

“70% of the consumer’s buying decisions are made in the retail store”.

This is a common anecdote used by market researchers when quantifying the importance of getting the retail strategy right. Even if the 70% figure is an overestimate and the actual number is closer to 50%, the key message for us is that getting a brand’s retail presence right is as important as creating the brand image itself through advertising and shaping the messaging.

Within retail, how a brand shapes its presence on the shelf is very important. But there is a big blind spot - getting objective insights about the quality of a brand’s shelf presence on a large scale is extremely challenging.

With this whitepaper, we introduce an AI based shelf monitoring solution that makes the process of analyzing retail shelf images extremely efficient and flexible. At Karna-AI, we strongly believe that the process of collecting and analyzing market research data will be greatly influenced by Artificial Intelligence. We are here to help drive this change.

Traditional ways of deriving retail presence insights are inefficient and expensive

Brands and agencies typically do shelf measurement by getting their representative or partners to get images of retail shelves from different regions of the country and then code the attributes (brand facings, area, count) manually. Doing so is costly, time consuming and an inflexible approach. With latest advancements in computer vision, the time has come to let the algorithms do the attribute coding.

Conceptual Case Study

Analyzing reasons for decline in sales of Red Bull

An overview of how AI driven shelf monitoring can deliver high-value insights

Suppose Red Bull notices a decline in its sales volume across the USA over last couple of months. This was a puzzling situation for the company as their market research had confirmed the following hypotheses about the brand.

1. Retail sales measurement data confirmed that the reach and stock levels of Red Bull's products remained healthy.
2. The company's advertising and promotion effectiveness have only increased over the past few months.
3. Customer surveys have revealed that the perception towards Red Bull brand has only improved over the past month.
4. There has been no notable change in competition dynamics for energy drinks market.
5. Retail sales data also confirmed that other competing brands' sales have also slowed.

In the light of above findings, the executives at Red Bull concluded that there could be some issue with its retail positioning. However, they were puzzled about how to objectively measure its retail presence quality and examine this hypothesis. They turn to a market research agency for help.

The research agency maintains a monthly database of images of shelves from ~5,000 retail stores across the USA. It decided to analyse the images of refrigerated shelves (that carry energy drinks) over a span of last 6 months. It then deployed Karna-AI's computer vision technology to get insights about visibility and quality of Red Bull's shelf presence compared to competing energy drinks and substitute products.

Karna AI's Computer Vision technology for Shelf Monitoring

Karna AI's algorithms are designed to take image of a shelf as input and identify the visible products. Along with identifying any fully visible product, it also gives the corresponding count, area and height.

The algorithm performs well even in practical scenario conditions where lighting is not ideal (for shelf image), products are kept in different orientations (tilted, backward) and the image is zoomed out.

A visual representation of how the algorithm detects the shelf presence of particular products:

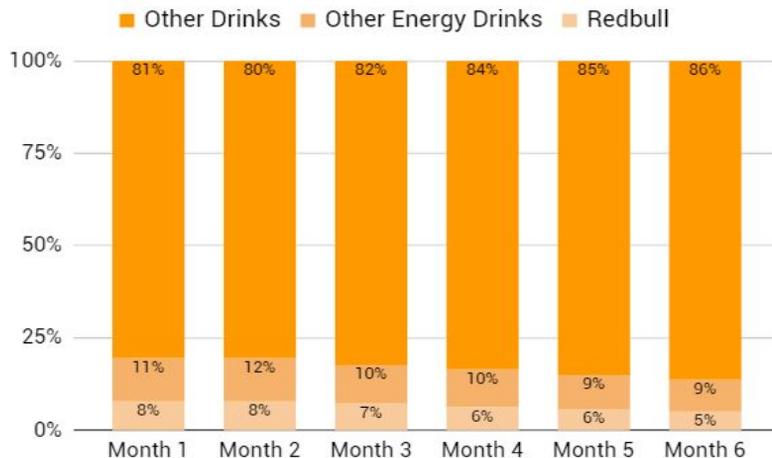


Analyzing Red Bull's Shelf Presence

Karna AI's Shelf Monitoring algorithms were used to analyze ~5,000 refrigerated shelf images for last six months. This converted all the qualitative data about shelf visibility of Red Bull and its substitute products into quantifiable metrics. The researchers now deploy data analytics techniques to uncover insights.

Firstly, the researchers analysed Red Bull's Visual Share of Shelf (VSS). VSS for a product is identified as the visible area of the product as a percentage of visible area of all the products on the shelf.

Visual Share of Shelf (VSS) of Red Bull vs Others



The researchers' suspicion was true, the visibility of Red Bull relative to other substitutes had declined over the past few months. Same was the case for other energy drink brands as well. Now the question is, what is causing this shift?

By further breaking down the VSS of other drinks, the researchers noticed that there was a strong growth in shelf visibility of Coffee and Protein based Health Drinks. Almost all the decline in the shelf visibility of energy drinks was at the expense of the rise in these two emerging beverage categories.

See the table to understand the shelf visibility of SKUs other than energy drinks on the refrigerated shelf:

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Soft Drink	34%	34%	35%	34%	33%	33%
Juice	15%	16%	15%	15%	16%	16%
Beer	12%	12%	13%	12%	12%	13%
Milk Based Drinks	11%	10%	10%	10%	10%	11%
Health Drinks	4%	4%	4%	7%	8%	8%
Coffe	4%	4%	5%	5%	6%	7%
Total	81%	80%	82%	84%	85%	86%

Coffee and protein based health drinks have indeed been one of the fastest growing beverage categories. Over last six months, many FMCG giants had invested in bringing new products in these categories along with aggressive advertising and retail partnerships to gain leadership in this fast growing space.

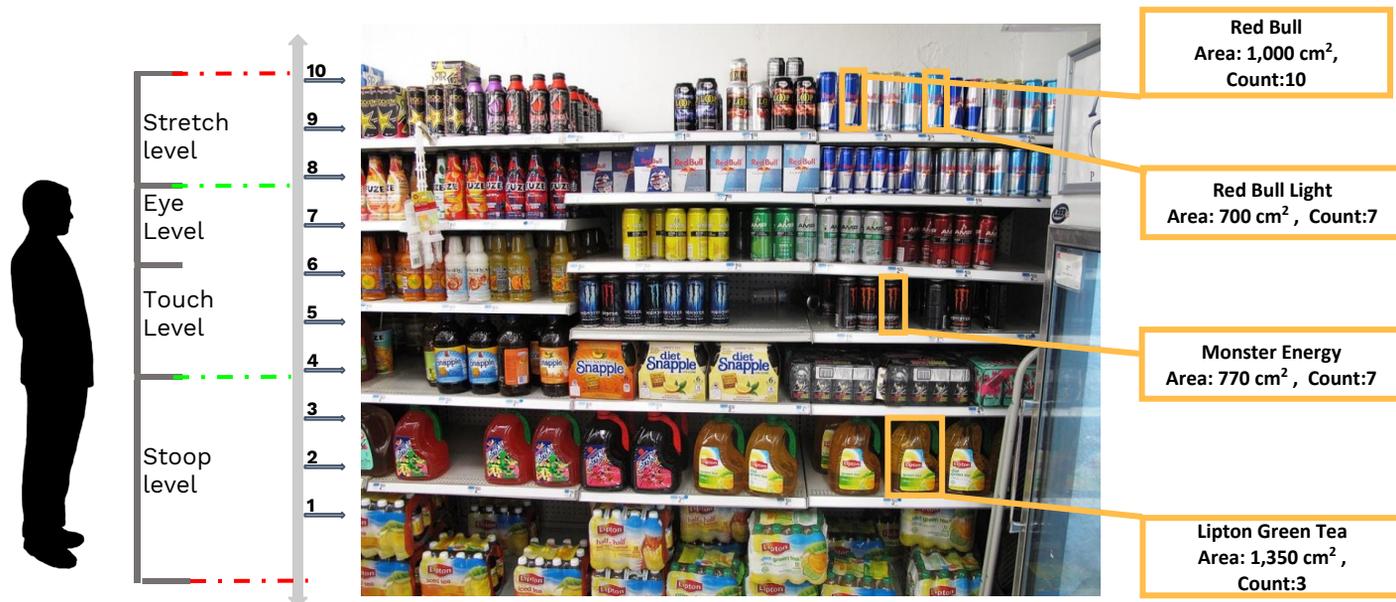
Energy drinks are known to have a niche market of its own and the executives at Red Bull paid little attention to the rise of new categories. They got blindsided by this shift. Armed with insights from AI driven shelf monitoring, the executives now decided to gather some further insights into corrective actions.

Further Insights for guiding corrective actions

By now, it was established that energy drinks were being given less retail space to make way for increasing product offerings in the Coffee and protein based health drinks categories. Doing some number crunching revealed that the decline in VSS was most pronounced in smaller stores in the smaller US cities. This is one area where Red Bull has little visibility and control over retailer's shelf decisions.

One of the researchers also suspected that Red Bull was also being given unattractive positions on the shelf to make space for the emerging categories. “Eye Level is the Buy Level” is a common saying in the retail industry. Any brand prefers to place its products at or near the eye to increase the likelihood of consumers choosing the products and Red Bull is no different. The researcher decided to measure the average height at which Red Bull’s products were being displayed on the shelves.

The analysis below shows that Red Bull’s presence in the preferred eye level zones (4-8 level) has also reduced considerably. This is an important insight which further explains the reason for the drop in the product’s sales.



The table below highlights the fact that the presence of Red Bull’s SKUs at eye level has significantly reduced.

Levels	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
10-8	13%	14%	13%	15%	16%	17%
8-6	36%	36%	35%	33%	33%	32%
6-4	32%	31%	31%	30%	29%	28%
4-3	10%	11%	12%	12%	13%	14%
2-0	9%	8%	10%	10%	9%	9%

Conclusion

With AI driven shelf monitoring, the agency was able to prove the hypothesis that Red Bull's deteriorating shelf presence was primarily responsible for the decline in the product's sales. More importantly, the agency was able to do this in a time bound and cost effective manner while also identifying the underlying reason and getting further insights for taking corrective actions. We, at Karna-AI, believe that AI is going to be a big driving force in the future of market research and we are here to facilitate that change.

Karna-AI Technology Box

An overview of AI technologies showcased in the whitepaper

In this section, we are listing down the AI-powered technology and algorithms used by Karna-AI to automate the shelf monitoring in retail stores.

Image Processing

Our deep learning powered image recognition algorithm, can analyze images at scale for detecting objects, entities, demographics and emotions.

- Object Detection: Detects objects present in images such as humans, cars and SKUs.
- Object Recognition: Identifies particular objects present in images such as Red Bull's SKUs, Monster's SKUs and Lipton's SKU

See our [blogpost](#) on visual analytics for a similar analysis on Instagram images. At Karna AI, we have built customized and niche algorithms for specific client use cases. Being one of the best applied AI research teams in the world gives us the confidence to deliver on such outcomes, even when there are no precedents for such projects in the AI research community.

AI Solutions for Market Research

We believe AI will be at the core of successful market research undertakings of the future. Our vision is to help drive this shift.

[Karna-AI](#) is the Market Research AI solutions division of [ParallelDots](#), a premier applied AI research group. ParallelDots provide AI solutions and consulting to some of the largest enterprises in the world. Our APIs are used by 1,000+ developers across the globe.



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Contact Us:



Kushank Poddar
Head of Business

kushank@paralleldots.com
+91-9820353142