

Leveraging the Power of Images in Predicting Product Return Rates

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Abstract

Compared with offline channels, online channels are challenged by high product return rates, which are in turn associated with considerable costs to the retailer. Therefore, predicting product return rates prior to product launch becomes important to make well-informed decisions in several areas such as online and offline product line optimization.

Based on sales and return data of a large European apparel brand in the online and offline channels, we aim at helping online retail management by forecasting return rates for individual products prior to launch, based on the products' visual characteristics. We demonstrate that first, consumers purchase different products online and offline, such that some products attain higher market shares online than offline. Second, we find that items more likely to be returned are those that sell more online and less offline. This finding suggests that, when shopping online, consumers make their purchase decision based on their online evaluation of the product. Once they receive the product, they rely on their offline evaluation to decide whether to keep or return it. Third, we propose a Gradient Boosted regression tree model, which uses visual features of the product extracted via a convolutional neural network and demonstrate that images considerably improve predictions of product returns rates. Using our model, retail managers can predict product return rates pre-launch and identify which products will be unprofitable if placed in the online channel, due to high returns.