

I. INTRODUCTION

As the number of Internet users increases, it is easier to write opinions online, especially when reviewing a product. A review can be a good testimonial for prospective buyers to decide whether to buy a product or not. Product reviews are also crucial for product vendors [1]; they could give insight into the user's experience while using the product. Insights from product reviews are used to improving product knowledge and product marketing strategies. The number of good and bad reviews can affect the impression given on the product, which spammers can use to lead the reader's opinions and create a loss of confidence in users of the product reviews on the internet.

There are multiple reasons why someone wants to do a spam review; some paid spammers write good or bad reviews on a product to direct the reader's opinion about the product [2]. In some other cases, users intentionally leave different sentiment in reviews and ratings to drop or leverage average product rating. Rating is important; when talking about a product, a first impression rating can represent how great the product is and how product users think about it.

A study by He, Sherry et al. show how spammers from certain Facebook Groups could deceive Amazon's Spam Detection algorithm by not directly linking the product. However, by asking the paid reviewer to search the product, the algorithm cannot detect multiple reviews as spam [3]. As we can see, there are many ways to produce spam reviews. Thus there should be a definition of which reviews are categorized as spam.

A previous study by Jindal and Liu [2] defines the review spam categories as follows :

Type 1; reviews that are intended to mislead the reader, guiding the reader's perception into the wrong side. This kind of reviews is usually more difficult to distinguish since the review are semantically similar to each other. Another way to distinguish a review that will mislead the reader is when a review sentiment does not match the rating that they give [4]. This rating will be an outlier and changing the average rating of a product.

Type 2; reviews that do not examine the product but instead discussing the external aspect of a product, such as the brand, how easy to get the product, the brand campaign, et cetera. One of the samples of spam review in this category is a review of how a brand does not hurt animals in producing the product, which is out of context when written on the product reviews page.

Type 3; The last category defined by Jindal and Liu is when a review does not contain opinions; instead, it contains questions, tutorials, or something similar to that but does not include opinions about the product. This type of review is easier to distinguish when a review has an extreme review text length, either too long or too short.

Although several studies discussed review spam detection on English text, there are only a few studies were performed on Indonesian text. In this work, we performed review spam detection using features from a review and the reviewed product, such as rating, review, product brand, and product descriptions.

We used data from an online beauty product reviews forum in Indonesia called Female Daily¹. Table I shows the example of product review data. Then we extracted the features from the review and the product to generate features based on review data obtained from Female Daily. The contributions of our works are as follows:

- Given the unlabeled data of product reviews in the Indonesian Language from Female Daily, we annotated the dataset based on Jindal and Liu's definition of spam reviews [2].
- We extracted some features related to review text, review rating, product, and review sentiment. Based on previous works, this type of feature can help determine whether a review is a spam review or not.
- We performed review spam detection with extracted features in several settings, including a combination between feature categories.

¹ <https://femaledaily.com>