CHAPTER I INTRODUCTION

1.1 Research Background

Fashion in Indonesia is one of the leading Creative Economy subsectors (Ahmad et al., 2023), contributing 61.5% of Indonesia's total Creative Economy exports (Ibrahim, 2023). This success is appreciated and will be developed by the Creative Economy Agency. The development that is carried out will give rise to various types of models, accessories, and types of fabric materials. The type of fabric material is one that is not commonly known to all types of the public because there are dozens of types of fabric materials that have been widely circulated. This ignorance can trigger fraud by unscrupulous sellers of fabric or apparel to the public.

To avoid fraud, a solution is needed to classify fabric materials so that they can find out whether the fabric to be purchased is what they want. For the classification stage, the solution to be created should be able to distinguish each type of fabric material entered and issue results in the form of the name of the fabric material. This solution can be done well by Artificial Intelligence (AI), which can process various kinds of information obtained and learn it to produce a prediction, decision, and so on. The classification of fabric materials has been done before by Donati et al. (2019). This research classifies clothing materials using deep learning based on 6300 image data from three materials as training and test data, and the final accuracy achieved is 85.4%. The results of this study were able to classify the three fabrics. However, this research only works on three fabric materials: cotton fabric, synthetic fabric (generic), and viscose fabric. Then, this research classifies fabric

materials only based on training data images and test data in the form of ordinary clothes photo images, not in the form of images that have been enlarged to the base of the fabric so that it is less accurate in distinguishing the fabric material to be classified.

Classification of fabric materials using AI has also been done by Mori et al. (2020). This research classifies fabric materials based on the colour patterns used. The technology used for classification is machine learning as part of AI with the forward propagation neural network algorithm. The results obtained distinguish the three fabric materials that have been determined. However, this research only classifies three fabric materials, namely yukata, aloha shirt, and kariyushi shirt, based on their colour pattern, so this research cannot be widely used because of the limited classification provided.

Each fabric has its structure, and each type is different. So, it is impossible to distinguish fabrics based on the colour pattern or other patterns that will be the same when placed on other fabrics. However, this difference in structure cannot be seen directly; a magnifying device that can see down to the base of the fabric is required to see significant differences. Kod oman et al. (2023) conducted a study to classify fabric materials based on their structure. This study used a Canon IXUS 50 camera to capture images of fabric structures. For image classification, this study used data analysis using hierarchical cluster analysis (HCA) and principal component analysis (PCA) methods. However, the study was only focused on the subjective assessment of 12 visual material preferences of fabrics. The semantic content was not specified, so respondents did not know which fabric materials they evaluated.

Because there is no appropriate solution to classify clothing materials, this study will create a device to classify clothing materials based on their structure. The best classification method is required. Some research with classification methods and good results has been done, including Al Mudawi et al. (2023), which classified cars running on the streets. This study classifies the model into nine classes and eight classes using the YOLOv8 algorithm with two types of datasets, each of which consists of 6000 images of cars on the road. The accuracy results obtained are 95.6% and 94.6%, which are good and can classify cars that are running well.

A deeper classification at the micro-scale has been done by Akhtar et al. (2023) in classifying cells present in urine sediment in human urine samples. Urine is classified into 11 classes of urine particles. Classification is done using the YOLOv8 algorithm with 91% accuracy. Another micro-scale was also done by Trong Luong et al. (2023) to classify normal white blood cells and leukemia cells, where there are five types of white blood cells. This classification is also done well by the YOLOv8 algorithm with 95.1% accuracy.

The three classification studies above show that the YOLOv8 algorithm works well in classification both on a macro and micro scale. Therefore, in this study, the YOLOv8 algorithm will be used to classify 17 fabric materials with an input of 100 images for each type of fabric material with a total of 1.700 raw data images that will go through preprocessing and will increase the number of images according to the preprocessing performed. This data must be captured by a camera that can see the structure of the fabric. Digital Microscope Endoscope Camera Magnifier 1.600x USB has a dataset that shows this camera can be used to inspect textiles and other

industrial materials. Therefore, this study will use a Digital Microscope Endoscope Camera Magnifier 1.600x USB as a sampling camera. The preprocessed images will then be trained with the YOLOv8 algorithm to remember the 17 types of fabric materials. Finally, the classification results with the output of the name of the fabric being sampled will be displayed on the LCD.

1.2 Research Purpose and Benefits

This research aims to create a prototype tool that can classify clothing materials based on their structure using computer vision. The benefit of this research is to provide solutions for all people so they can easily distinguish the fabric that will be purchased.

1.3 Research Scope and Limitations

The scope and limitations of the research used in this study are as follows:

1. The input image data used are previously photographed images of fabric structures totaling 1.700 raw data images.
2. Using the YOLOv8 algorithm to train fabric classification data.
3. The camera used in this study is Digital Microscope Endoscope Camera Magnifier 1.600x USB.
4. Classification was carried out on 17 types of fabric materials commonly used for clothing in dry condition, namely cotton, canvas, linen, denim, satin, silk, polyester, rayon, leather, suede, organza, jersey, nylon, jacquard, wool, spandex, and lace/brocade.