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SURVEY ON NUDITY DETECTION: OPPORTUNITIES AND CHALLENGES BASED ON 'AWRAH CONCEPT IN ISLAMIC SHARI'A

GIAT KARYONO[1], ASMALA AHMAD[2], SITI AZIRAH ASMAI[3]
[1]Department of Informatics Engineering, STMIK AMIKOM Purwokerto, Indonesia
[2,3]Faculty of Information and Communication Technology, University Teknikal Melaka, Malaysia
[1]giatkaryono@amikompurwokerto.ac.id, [2]asmala@utem.edu.my , [3]azirah@utem.edu.my

ABSTRACT

The nudity or nakedness which known as *awrah* in Islam is part of the human body which in principle should not be seen by other people except those qualified to be her or his *mahram* or in an emergency or urgent need.Nudity detection technique has long been receiving a lot of attention by researchers worldwide due to its importance particularly to the global Muslim community. In this paper, the techniques were separated into four classifications namely methods based on body structure, image retrieval, the features of skin region, and bag-of-visual-words (BoVW). All of these techniques are applicable to some areas of skin on the body as well as on the sexual organs that should be visible to determine nude or not. While the concept of nakedness in Islamic Shari'a has different rules between men and women, such as the limit of male *'awrah* is between the navel and the knees, while the limit of female *'awrah* is the entire body except the face and hands which should be closed using the hijab. In general, existing techniques can be used to detect nakedness concerned bythe Islamic Shari'a. The selection ofhese techniques are employed based on the areas of skin on the body as well as or the sexual organs to indicate whether it falls to thenude category or not. While in Islamic Shari'a, different 'awrah rules are required for men and women such as the limit 'awrah, the requirements of clothes as cover awrah, and kinds of shapes and shades of Hijabs in various countries (for women only). These problems are the opportunities and challenges for the researcher to propose an *'awrah* detection technique in accordance with the Islamic Shari'a.

Keywords— *'Awrah Detection; Nudity Detection; Based On Body Structure; Based On Content Image Retrieval, Based On Regions, Based On Visual Words*

1. INTRODUCTION

Studies on detection of human nudes have long been carried out by many researchers due to their concerns particularly pertaining to religion and culture. In Islamic Syariah, *'awrah* in other word, nakedness, is part of human body which in principle should not be seen by other people except in an emergency or urgent need. The obligation to cover *'awrah* is written in Quran Surah Al A'raf ayah 26 which reads:

يَٰبَنِيٓ ءَادَمَ قَدۡ أَنزَلۡنَا عَلَيۡكُمۡ لِبَاسٗا يُوَٰرِي سَوۡءَٰتِكُمۡ وَرِيشٗاۖ وَلِبَاسُ ٱلتَّقۡوَىٰ ذَٰلِكَ خَيۡرٞۚ ذَٰلِكَ مِنۡ ءَايَٰتِ ٱللَّهِ لَعَلَّهُمۡ يَذَّكَّرُونَ ٢٦

Which mean: "*O children of Adam, We have bestowed upon you clothing to conceal your private parts and as adornment. But the clothing of righteousness - that is best. That is from the signs of Allah that perhaps they will remember*".[1]

This verse is the basis that oblige human to close the *'awrah* because in it there is a command "to conceal your private parts." This ayah also describes the two functions of clothing, namely, to cover private parts and as adornment of one's body. Some scholars have even suggested that this verse states the third function of clothing, i.e. righteousness or god-fearing. Such clothing can avoid disaster and hardship both in this world and hereafter. The scholars agreed that the *'awrah* of men is between the navel and the knees. Referring to Quran Surah An-Noor verses 31, for women, the word of "what is appear thereof" refer to the face and hands [2]–[4] of a women. According to Ahmad Ibn Hanbal and his followers, the entire woman's body is *'awrah* and must be covered by dress without exceptions. Al-Shawkani reported that some of the Shafi'i followers opined that a woman must cover her entire body, including her face and hands [5].

Studies on detection of human nude has took place as early as 1996 where Forsyth et al. [6] made use of huge collection of images to determine whether human nudes presents in an image. They used fusion of color, texture, and geometry properties to first detect the present of human and then the nudeness in an image. Skin regions were then determined using a combination of RGB color

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spaces. This together withtexture information were next fed into a specialized grouper in order to group human figure based on geometric information and human structure. A similar approach was also practiced in [7]–[9]. In [10]–[13], content-based image retrieval known as CBIR compares the semantic content of images mainly the human body by measuring the correlation between the picture in the pre-classified database and query image through similarity measure researchers. [14]–[33],[34],[35] demonstrated the features that reflect skin properties can be extracted are such as color, texture, geometric, shape, and edge. After these features are extracted, they are classified using a statistical classification tool. Support Vector Machine (SVM) classifier is the frequently used technique that isutilized by several researchers.

The utilization of the low-level features have a limitation in modeling of global visual concepts (e.g., images contain naked people) that have various meanings (such as the pubic, breast, nude action, etc.), because the low-level features only allow the correct classification of contents images only. To solve gaps problem between the global visual and low-level visual features concept, semantic features need to be used as proposed in [36][37]–[39]. The biggest problems of the use of low-level features are the ability to detect skin accurately due to the high fluctuation in shapes and geometry of such pictures. Other technique known as Bag-of-feature has been used in [40]–[52] used local image features into for detection and was found successful in visual recognition and classification. This approach does not require object model, variability of shape, and scale or illumination in performing detection. Some researchers used sexual organs such as nipple [53]–[56], breast and pubes [57] to enhance the performance of the detection.The goal of this paper is therefore to carry review between nudity detection and 'awrah detection using image processing approaches and relate them to the Islamic Shari'a. Section 2 of this paper briefly describes literature review of nudity detection. While section 3 explains the concept of ‘awrah based on Islamic Shari’a. The last section outlines the discussion and conclusion.

2. LITERATURE REVIEW OF NUDITY DETECTION

The approach of [6]–[9] based on structure human body that represents naked people or scantily dressed people as collections of cylinders, each representing a body fragment with the following stages. This approach marks skin-color pixels using texture and color information. Once these regions discovered, then fed to a specialized grouper, that attempts to assembled into the appearances of people using geometric obstacles on the human structure. The experimental results show that this approach not accurate and a specialized grouper not efficiently at the rate of approximately 10 per hour. Following this approach, [58] proposed an approach for pruning a brute force search in many candidate fragments using projections classifier. This approach makes the search for limbs configurations efficient. In [59] proposed a probabilistic framework which began by finding segments and used to generate assemblies by incremental sampling based on a learned likelihood model from the segments. Finally, a smaller set of representatives replaces the set of the construction. The approach allowed top-down as well as bottom-up reasoning. This pruning steps can avoid overwhelmed by vast numbers of segments.

In the WIPE$_{TM}$ project, [5],[6] proposed an approach uses a combination of Daubechies’ wavelets, color histograms, and normalized central moments to serve semantically-meaningful feature vector matching so which comparisons pictures in a pre-marked training set and the query picture can be accomplished effectively and efficiently. While, [13] combined CBIR and skin color analysis to find out whether people are present in the picture. In the retrieval process, this approach developed using k-nearest neighbor search (KNNS) method, which speeds up the entire system. The combination of them reduced the false positives while retaining a high true positive. Meanwhile, [12] used CBIR techniques for identify naked images in videos. Earlier, the background region is removed using skin detection to get Region of Interest (ROI) and then extract it using color, texture, and shape to similar image retrieval. Finally, 100 number of similar images to be retrieved from a database and will be matched similarity as a determinant of whether or not nude.

A series of similar processes to detect the naked pictures was done by several researchers by considering stages as follows: **The first stage** is the skin filter**.** This step vital because there is a strong connection between pictures with large skin regions will determine nude images. The skin filter is used for regions separation that suspected as the skin and not the skin by making use the color space, texture, or statistical for skin modeling. [60] compared the performance of mixture models and histogram in skin filter and find histogram models which the best in computational cost and accuracy. They developed a remarkably effective detector for nudity people using aggregate features computed. This color model has been also used in

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[25][32][35] as the skin filter. Other than that, [61] proposed a maximum entropy model (called as the first order model) for skin detection. This model was subject to restrictions on the color gradients of neighboring pixels. The output of skin detector was a grayscale skin map with the gray level showing the possibility of skin. Two fit ellipses called as Local Fit Ellipse and Global Fit Ellipse used for each skin map as simple features. HSV color spaces in [21], [28], [31], [62] [63] and YCbCr color spaces in [15], [26], [27], [29], [30], [33], [56] are the two color spaces of common used by some researchers. [9] and [18] however made use combination of two color spaces namely YUV and YIQ while the researchers in [19] combined three color spaces at once (namely YIQ, YUV, and HSV). Similar background with skin-color (e.g. yellow sofa, sands, wood, animals, etc.) have been found affecting the detection result. Therefore [19]and[34] chose Gray Level co-Matrix (GLCM) as texture model to solve these problems. [30] combined the back-propagation neural network with a segment adjacent-nested (SAN) on RGB and the Bayesian method with a grouping histogram (GH) on YCbCr which at once solve problem the illumination condition changes and reflection from glass and water. The different techniques such as a learning-based chromatic distribution-matching schema [18][22], Gaussian Mixture Models (GMM) [17][20][24]and Bayes skin classifier on RGB [16] also used to solve problems illumination condition changes. There were also effort attempting to solve other problems that often occur in skin filter namely background or other objects that are similar to skin color and causing errors in detecting using different techniques such as morphological operation [16],[62] and edge and texture [9].

The second stage is feature extraction has the goal to look for the vital features to tell whether the images contain naked elements. The feature of the skin regions are extracted using color [14], [15], [17], [19], [21], [23]–[30], [32], [33], [35], [63], texture [17]–[19], [23]–[26], [32], [34], [35], shape[16], [18], [25], [26], [29]–[32], [35], [61], geometric [15], [22], [31], and edge [19]. [16] used the same features between the features of skin regions and the classification input with expectations produce excellent performance rather than each feature classified individually due to their combination will supplement each other. While, [14][20] used the different feature with the feature of skin regions, namely color coherence vector (CCV) and color histogram as input classification. [32] used Self Organizing Feature Maps (SOFM) and correlation analysis to find important features associated with nudity [22] identified whether there is the navel feature or not. The navel considered the center of the body and can be identified using the intersection of the four rectangles as the main rectangles. Meanwhile, [62] made use high-level features with dataset that have been classified into five categories: nakedness (an images contain person that show sexual organ or sexual acts); nude; benign people (person with different poses); people with limited portraits between the shoulders and head; miscellaneous and graphics.

The last stage is the use of classification tool to predict the input images such as SVM in [14][15][19] [20][23][24][26] [29][31][34][35], k-nearest neighbor [62], Bayes Decision [25], Neural Network (NN) [17], Adaboost [18], MLP [61], and FP-NN(Forward Propagation Neural Network) [17]. The FP-NN is a machine learning algorithm of neural network using a geometry representation of McCulloch-Pitts neural model. Experimental results show that the FP-NN is quite efficient [64]. In [32], a vector of the selected features is used for training fuzzy integral based combination of MLP and Neuro Fuzzy. While, the combination of the back-propagation neural network with a segment adjacent-nested (SAN) on RGB and the Bayesian method with a grouping histogram (GH) on YCbCr which proposed by the in [25] as known as a multi-agent learning method becomes more speed to the difference in images sizes. The last combination proposed by the researchers in [16] combined AdaBoost algorithm and multiple classifiers (e.g. C4.5, decision stump, Multi-Layer Perceptron and SVM) to enhance the performance of a weak classifier. Several other researchers used the percentage of the skin regions as a classification tool. Images will be predicted as naked if the criteria the percentage is more than 20% in [63] and 50% in [27]. While, [21] used the three largest of the skin regions of a bounding polygon to classify images. [28] proposed RSOR algorithm which compared between the percentage of skin-color pixels in the image consisting of or divided into segments and the original image. If the percentage was more than 25% called as nude. While, when the proportion of the biggest region amounts less than 35% were according to estimated, it was included not a nude. The percentage of the skin regions also used by [33] using the C4.5 algorithm with three new measurements: %Face_Area, %AHB and Rmax. The criteria which used for classifying images as follows %AHB>=0.4, %Face_Area<=0.3, and (%AHB < 0.4 and Rmax > 0.1). When skin region was smaller than 0.4, it was considered of the most difficult to identify.

In text-based classifier, there was an approach called the bag-of-words models namely an unsorted arrangement of the contained words in the

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document. This method was implemented in [40] for developing a techniques as known BoVW (namely, the bag-of-visual-words). This BoVW has similarity with the-bag-of-words, but the difference is in the form of visual words. As local features, the visual words extracted from pictures, the visual vocabulary is developed based learned errand-particularly from a training database. A set of classes divided into several different a class. The SVM classifier was the popular classification tool which usually used in this technique. The DoG (Difference-of-Gaussian) and SIFT descriptors used for identifying patches as local features. While that, the visual vocabulary trained by used Gaussian mixture models. The different training techniques proposed by [49] using K-Means for develop visual vocabulary in texture (using the local binary patterns) and shape feature (using SIFT descriptors).

To better performance in weighting scheme of visual words, a novel soft-weighting method has been resulting from the impact factors (such as patches detector, weighting scheme of visual words, a size of visual vocabulary, and kernel function) which have been evaluated by [65]. This soft-weighting also has been used by the researchers in [45] on Region-of-Interest and color moments. While that, [42] tried the BoVW models in videos with based on the gray level information in SIFT descriptor. At the same time in different paper, [38] used the Hue-SIFT algorithm (namely, hue histogram with SIFT descriptor). These two techniques have been successfully implemented with the main advantage were does not depend on skin filter or shape modeling, simple, and more generic.

Sometimes an image was also stored in a compressed format which requires extra time for decompressing. To solve this problem, [46] introduced the techniques with the steps as follows: Firstly, construct the images which contain the low resolution using decode four DCT coefficient. Secondly, SIFT descriptors on DoG used for extract feature. Thirdly, PCA used to construct visual vocabulary which trained by K-Means algorithm. Fourthly, SVM classifier used to classify images. While [47] used the integral image, AdaBoost algorithm, and a cascade classifier to detect the face area. The visual attention model constructed using a combination between global salient map and local salient map. The face area removed to obtain naked area only. The local feature extract using SIFT descriptors on gray-level information. Visual vocabulary constructed using K-means algorithm. [66] proposed to complete the issues with one-class methods in binary classification techniques using the Bag-of-Words (BOW) model. The skin detection (in [67]) and SIFT descriptors used for identifying patches as local features. While that, the visual vocabulary trained by using K-means clustering. The BoVW and unlabeled vectors optimized by way of using the trained one-class SVM. The experimental results show that a better performance with lower time consumption.

To improve the performance both in speed and accuracy, [41] proposed color moments and SURF descriptors used for identifying patches as local features. While that, the visual vocabulary trained by using K-means clustering on DBSCAN. The BoVW has been improved by the way calculate and cross-matching between feature points and visual words to obtain strong speed and low computation cost [46]. The BoVW model has some problems associated with high false positive rates, such as people with bikinis images and nudity action. To address the problem, the [39] improved BoVW with some stages as follows: Firstly, the distance estimates to the mean of all features at the time the creation of the visual vocabulary. Secondly, a weighted distribution of the category similar to nude images is employed at the time the trained classifier. Thirdly, the use of the topological triangular relationship of body organs to extract the discrimination features of nude pictures. Finally, the semantic tree constructed which consists of human body structure model and human action model. In [47] SIFT algorithm was adopted for feature extraction based on wavelet transform. A visual vocabulary developed by using K-means clustering. Finally, the face information is used to eliminate wrong rate images with large face areas. Classes of the people with naked action and bikini have also been solved by a number of researchers using low-level features such as the shape [68] and geometry [36] as feature extraction in the region of interest (ROIs) on the RGB color spaces. The categorization model of naked and benign using random forest classifier [36] and CBT (curve as the contour of body trunk) [68]. The experimental result both methods show that high accuracy. A SIFT and SURF algorithm have the biggest problem in constructing the high dimensional feature vectors because this algorithm needs high computational complexity. [50] proposed a BoVW based model by adopting FREAK descriptor that which was in general faster to compute patches descriptors with lower memory load. The experimental results showed that there is enhancement at the computational complexity.

An images although contains the large percentage of human skin area was not yet considered of naked if it not yet contains one or more nipples and or sexual organ. [53] used HSV color model to detect skin regions then fed it into the NN (neural network). Identify whether tested

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window was the nipple or not the nipple using Kohonen's Self-Organizing Maps. In contrast to [56] that used YCbCr color spaces for the skin modeling with consideration this model fit for used under some established conditions. The nipples images extracted using Haar-like features and for assure accuracy Adaboost haar-cascade classifier used it. The experimental results showed that haar-cascade classifier was suitable for accuracy problem, but train-cascade classifier was a better while for time detection problem. The AdaBoost algorithm was also used in [54] to find the potential nipple and for checking the authenticity of nipple based on the shape and skin-color information of the nipples and the surrounding skin. Detection of other sexual organs such as breasts and pubic also have been presented in [57] based on trunk location and integrating it with method based on skin-color feature. The skin modeling developed by the way combining the information of the face and chest which previously has been detected by Viola-Jones algorithm to detect the face. A simple decision tree classifier used for classifying images. The experimental results showed that algorithm has been successfully improving the precision and decrease the false positive rate, but speed was not yet optimal for the practical used.

3. THE CONCEPT OF 'AWRAH BASED ON ISLAMIC SHARI'A

Islam has set certain limits between *'awrah* of male and female. Islam protects female *'awrah* with the religious spirit and the spirit of Islam. The 'awrah needs to be closed to deter the onset of slander. The definition of *'awrah* has many meanings. According to the understanding of language (literal), *'awrah* is a shortage and something that brings reproach. Among the fraction form words, it was 'awara`, meaningful reprehensible; namely awrah itself and all that could cause embarrassment [69]. In a different sense can be defined as all things that cause shame [70]. Whereas within the meaning that almost the same can be interpreted as every which causes embarrassment and bring disgrace to its owner if it looks [71] or whatever that causes a shame if it looks [72] and can also be interpreted deficiency and something that causes reproach [73][74]. After that, the meaning of the *'awrah* is more widely used to reveal the shame that happened on something that should be guarded and closed, namely three times when the cover was opened [75].

In the Quran, the words of *awrah* repeated four times with different meanings. The term of awrah can be defined limbs that must be covered (In the Surah an-Noor verse 31). In a different sense is defined as three kinds of time which are usually at times the bodies are often open (In the Surah an-Noor verse 58). Last, it repeated twice which both of them mean overt (In the Surah Al-Ahzab verse 13). The basis of command to close the awrah is not only present in the text of Quran, but also contained in the hadith. In a hadith, the Prophet explains about the command closed awrah and the boundary of awrah for women who have reached menstruation as follows:

It was narrated from 'Aishah that Asma bint Abi Bakr entered upon the Messenger of Allah SWT wearing a thin garment. The Messenger of Allah SWT turned away from her and said: "O Asma, when a woman reaches the age of menstruation, it is not proper for anything to be seen of her except this and this." And he pointed to his face and hands. [76]

In another hadith which commands close the *'awrah* and things associated with its

Bahz bin Hakim narrated from his father, from his grandfather, who said: *"I said: 'O Prophet of Allah! Regarding our 'Awrah, what of it must we cover and what of it may we leave?' He said: Protect your 'Awrah except from your wife or what your right hand possess' He said: "I said: 'O Messenger of Allah! What about when some people are with others?' He said:'If you are able to not let anyone see it then do not let them see it.'" He said: "I said: 'Allah is more deserving of being shy from Him than the people'"*. [77]

An absolute obligation that must be implemented by every person, both men and women of Muslims which have been until age to close his 'awrah based on some pieces of the verse of the Quran and Hadith above. Islam allows the woman to expose herself and jewels to those who are entitled namely her husband.

4. DISCUSSION AND CONCLUSION

Based on the result of a literature review in the previous section, nudity detection techniques are grouped into four classifications namely methods based on body structure, image retrieval, the features of skin region, and bag-of-visual-words (BoVW). The summary of the performance of nudity detection is presented in the different group table as presented in this bellow.

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Table 1 The Performance Of Nudity Detection Based On Body Structure

Researchers	Feature Extract	TP	FP
[7]	Color and Texture	79.3%	11.3%
[8]	Color and Texture	43%	30.91%
[9]	Color, texture, shape	43%	30.91%

Table 2 Overall Classification Performance Of Techniques Content Based Image Retrieval

Researchers	Feature Extract	TP	FP
[10]	Texture and shape	95.20%	10.70%
[11]	Texture and shape	96.00%	9.00%
[12]	Color, texture, and shape	99.54%	16.51%
[13]	Color and shape	90.50%	7.50%

Table 3 The Performance Of Nudity Detection Based On The Feature Of Skin Regions

Researchers	Feature Extract	TP	FP
[14]	Texture	89.30%	9.40%
[15]	Color	75.00%	14.00%
[16]	Shape	89.20%	15.30%
[17]	Color, texture, and shape	81.00%	12.50%
[18]	Texture and geometric	71.70%	4.87%
[19]	Color and texture	84.60%	2.34%
[20]	Color and texture	90.44%	5.87%
[21]	Color	94.85%	6.52%
[22]	Color, shape, edge	90,40%	2.66%
[23]	Color and texture	90.18%	9.75%
[25]	Color	91.48%	7.80%
[26]	Color, texture, shape	96.17%	3.88%
[27]	Color	88.80%	5.00%
[28]	Color	92.12%	4.70%
[29]	Color and texture	96.80%	3.20%
[30]	Color and shape	96.60%	2.67%
[31]	Shape and geometric	91.90%	6.64%
[32]	Color, texture, and shape	86.97%	5.38%
[33]	Color	85.20%	4.20%
[35]	Color, texture, shape	76.50%	5.00%
[36]	Geometric	88.20%	11.8%
[53]	Color	65.40%	34.60%
[54]	Haar-like	75.60%	24.40%
[55]	Haar-like, color, texture, shape	65.40%	22.00%
[56]	Haar-like	98.75%	1.00%
[57]	Color, shape	80.31%s	19.69%
[68]	Shape	91.50%	4.55%
[78]	Color; texture	90.00%	3.50%
[79]	Shape	86.10%	13.60%
[80]	Shape	89.90%	3.30%
[81]	Haar-like	75.60%	24.40 %

Table 4 The Performance Of Nudity Detection Based On Bovw

Researchers	Local feature	Global Feature	TP	FP
[40]	DoG and SIFT	Color	19.10%	18.80%
[41]	ROI and SURF	Color	98.90%	22.00%
[42]	HueSIFT	Color	81.60%	15.40%
[43]	HueSIFT	Color	84.60%	
[44]	DCT and SURF	Color	94.00%	6.00%
[45]	ROI and SIFT	Color	85.40%	
[49]	DoG and SIFT	Shape and Texture	84.20%	
[51]	SURF	Color	83.10%	
[52]	SIFT	Shape	88.60%	7.30%
[82]	SIFT	Color; Texture	87.68%	14.17%

The techniques based on body structure have the difficult in constructing human figure grouper because the human has complexity body structure. While, the disadvantages of CBIR techniques is the low-retrieval efficiency (if only used one of the features of texture or color) [83], a high semantic gap [84], and the time consuming to negative label examples [85]. Techniques based on the feature of the skin regions have some problems such as the similarity between human skin color and like object colors such as skin color (e.g. a wood, hair, yellow sofa, sands, etc). The lighting conditions and color, the skin reflected from glass and water, people under water, people dress swimming, a portrait shot, and naked action also has been solved by the several researchers. The people wearing bikinis have an even higher false positive rate, then those in [40] proposed a novel techniques know as Bag-of-visual-word (BoVW) to solve this problem. The one problem of the BoVW is needs expensive computation time. The BoVW based on SURF algorithm was proposed by [41] address this issue. The most of the current researcher focused on improving accuracy and complexity detection. Table 1-5 in above showed the performance of nudity detection based on body structure is still unsatisfactory compared to other techniques. The most of the existing methods depend on the amount of the human skin or the organ of the sexual (e.g. nipples, breast, pubic, etc.) which must be detected. Sometimes both techniques them are combined. However, for certain cases such as the women has been wearing a formal dress but she is not yet using the hijab as cover from the hair to the chest or still show her body shape, if use the existing techniques will be considered as non-naked. While the according to Islamic Shari'a, these cases will be seen as naked. As the prophet has said

"*…and the women who would be dressed but appear to be naked, who would be inclined (to evil) and make their husbands incline towards it. Their heads would be like the humps of the bukht camel*

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inclined to one side. They will not enter Paradise and they would not smell its odour whereas its odour would be smelt from such and such distance" [86]

From the hadith above indicates that women who dressed but not cover awrah considered still naked. Al-Nawawi cited in [87] when described the above hadith as follows: (1) The women are closing the partially of her body but opening the partially of the other body; (2) The women are using thin clothing, so that still show her skin color. While Muhammad Nashiruddin Al-Albani cited in [88] described the women are using the thin clothing still drawing the shape her body, the clothes of them do not cover up (the parts of the body that obligatory covered perfectly). They were indeed clothed, however, in fact, they were naked. As Allah SWT says in Quran Surah An-Noor verse 31 which commands the women to cover awrah, which means

"*…that they should not display their beauty and ornaments except what (must ordinarily) appear thereof; that they should draw their veils over their bosoms and not display their beauty …"*

The interpretation of the word "ornaments except what (must ordinarily) appear thereof" according to [88] is do not reveal their adornment to a man of non-mahram. This adornment means: the adornment of the hidden such as ankle bracelet, two bracelets, two earrings, and necklaces. And the second is which the usually visible. While, [75] interpreted did not reveal anything of jewels to foreign men (non-mahram) except what is no longer possible to hide. Ibn Abbas said, "except the face, both hands, and rings". And the possibility that the Ibn Abbas and those who want to follow the interpretation of what is usually looked as the face and both hands. This opinion was famous among scholarly - and also heard from the hadith narrated by Abu Dawud in[76]. Meanwhile, [89] interpreted the face and both hands, the stranger is allowed seen if not fear of defamation. In the second opinion is forbidden visible (face and both hands) because can invite defamation.

The hadith in [76] indicates two things: Firstly, woman's obligation to close the entire body exception for the palms and her face. Secondly, the thin clothing is not eligible to cover nakedness. There are which opines one of the tools for cover the *'awrah* is the hijab. In the Quran, the word of the hijab is only called once, namely in the Quran Surah Al Ahzab verse 59 which mean

"*O Prophet, tell your wives and your daughters and the women of the believers to bring down over themselves [part] of their outer garments. That is more suitable that they will be known and not be abused. And ever is Allah Forgiving and Merciful.*"

But among scholars of the fiqh and Al-Mufassirin, the sense of the hijab itself is still happen controversy. Partially of Al-Mufassirin interpreted the clothes of brackets and the partially other explained the clothes women that loose to cover their heads and chests. According to Ibn Abbas, the hijab is a robe to cover the body from top to bottom [90]. While in [89] interpreted as rida' worn over khimar (veils). Some scholars argued: the hijab is the veil of the women which cover the head, chest, and back. The requirements of the clothing which accordance with Islamic Shari'a have been described by the [91]. He explained the dress which is used should be covering awrah entirely, not showing the shape of the body or the color of skin, and not designed with the aim to attract the opposite sex. While the women have special requirements, such as in Surah An-Noor ayah 31 which must cover the entire body except for what (must ordinarily) appear thereof. The part of the word "what (must ordinarily) appear thereof" was interpreted into two ways firstly defined as the hands and her face (this is the elucidation of most of the scholars). Secondly is meaning as the head covers which used for covering not just the hair, but it can also to the neck thus as to cover the chest. There are many kinds of shapes and shades of Hijabs in various countries such as called Ezar and Burqa in Cairo; Hebre in Saudi Arabia, Syria and Algeria; Chadors in Iran; Sari in India; Al-Hayek, Nighab, Al-Malaye in Algeria, Baju Kurung in Malaysia; and Jilbab in Indonesia [91].

The scholar of Syafi'i interpreted about *'awrah* limit as follows the men's *'awrah* is between the knees and the navel, and the women's *'awrah* is the whole body except for the hands and her face. It's just that some our scholar's opinion the navel and the knees include *'awrah*. While the limit of *'awrah* according to Hambali scholars as follows the men's awrah is between the navel and the knees. It's just that if the color of his skin that white and red still be seen then he can't be called covering *'awrah*. The women's *'awrah* is the entire body until her nails. Meanwhile, the limit of awrah according to Malikiy scholars as follows the men's 'awrah is between the navel and the knees, and both (the navel and his knees) including 'awrah. The free women's *'awrah* is the entire body except for the face and her hands. Last, the limit of *'awrah* according to Hanafiy scholars as follows the men's 'awrah is between the navel and the knees. There is also report that in addition to the navel until it reaches his knees. Thus, his navel is not including

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awrah. The free women's *'awra*h is the entire body exception for the hands and her face.

Based on the above discussion there are similarities regarding nudity detection based on Islamic Shari'a with current techniques. Overall existing methods have been accordance with Islamic Shari'a, but in Islamic Shari'a there are fundamental differences in determining nakedness especially related to the women wearing the formal dress but not yet use the hijab it is still not cover *'awrah*. The researchers realizes this is less common. However, this is the opportunity and challenge which interest to further research, namely to develop *'awrah* detection, particularly for women, based on Islamic Shari'a such as the limit 'awrah, the requirements of clothes as cover awrah, and kinds of shapes and shades of Hijabs in various countries.

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