Designing Face Recognition Teacher Wellbeing Application that Optimizes Teacher's Quality Work Life

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Abstract. Meeting the demands of industry 4.0, teachers are required to improve the quality of their profession. Quality professions will not be achieved if the teacher does not have a quality person and at the same time prosperous. By utilizing technological developments, the teacher can monitor and diagnose the condition of the self wellbeing on an ongoing basis, so as to optimize the quality of work life. Teacher's Quality Work Life is very important for teachers themselves as educators, institutions and the nation and state. Quality work life can be a measure of teacher growth vertically and horizontally along with the growth of the institution. The encounter of Education, psychological trait with Artificial Intelligence is called Positive Education is the main objective of this research. One form is a self diagnostic that is able to diagnose psychological conditions to produce optimal quality. This research aims to create an application face recognition design through Neuroresearch and Waterfall research methods. The results of the study were designed to build the Face Recognition Teacher Wellbeing application.

Keywords: Quality Work Life, Teacher Wellbeing, Face Recognition, Neuroresearch

1. Introduction
Object recognition can be done with a computer called computer vision through a combination of image processing and patterns (1). Computer vision was developed by replicating the sense of sight using computer software and hardware. Therefore computer vision can be collaborated with various fields of science including education and psychology. One interesting part of computer vision is face recognition. Face recognition usually includes four main modules, namely detection, alignment, feature extraction
and matching. The process of localization and normalization (face detection and alignment) is before the process of face recognition (facial feature extraction and matching) is done (2).

Figure 1. Flow Proses Face Recognition (2)

This research is a collaboration in the fields of computer science, education and psychology that combines profiling wellbeing that optimizes the quality of the work life of teachers through the design of the Face Recognition application.

The background to this concept is that to meet the demands of Industry 4.0, teachers are required to improve the quality of their profession. Carrying out the profession as an educator, teachers must be able to transform knowledge while providing a good example. Therefore, teachers need to build and have a quality of work life which is commonly referred to as quality work life. Quality work life is very important for an educational institution. This condition will help the institution to have human resources that are guaranteed the quality of their work which in itself will have a positive impact on their performance (3).

Teacher quality work life is very important for teachers themselves as educators, institutions and the nation and state. Quality work life can be a measure of teacher growth vertically and horizontally along with the growth of the institution. Quality of work life refers to the level of satisfaction, motivation, involvement, and commitment experienced by teachers in relation to their lives at work. Teachers' interests as individuals are still fulfilled just as they fulfill their work interests (4). The quality of fulfilling the quality of work life will be achieved when the teacher has a prosperous condition, both physically and psychologically known as wellbeing. Wellbeing condition is a fluctuating condition, because it has various trigger factors.

Teacher wellbeing can be interpreted as a condition of teachers' emotional and cognitive evaluation of their lives, related to happiness, peace, fulfillment, and life satisfaction. Various concepts ranging from mood swings to life satisfaction to global assessments, from depression to euphoria can also be a component in the measurement of teacher wellbeing (5,6) Teacher wellbeing is built by two general components namely cognitive and affective dimensions. Life satisfaction is one part of the cognitive dimension because it is related to evaluative beliefs about the life of the teacher (7,8). The cognitive dimension covers the areas of satisfaction / domains of individual satisfaction in various fields of life such as those related to oneself, family, community, health, finance, work and leisure (9). Affective dimension is the basic dimension of teacher wellbeing, which includes both pleasant and unpleasant moods and emotions (10,11).

Teacher wellbeing problems can arise as a result of demands for increased professionalism and increased welfare. A study states that work stress has a significant effect on the teacher wellbeing component (12). Teacher wellbeing associated with high levels of pleasure and activity is also associated with high positive level performance (10.13-15).
By utilizing technological advances and developments, it is expected that face recognition-based applications can continuously detect the teacher's wellbeing condition. The concept of self diagnostics is applied in this application so that teachers can independently detect themselves and implement intervention programs according to their needs so that teachers can optimize the quality of work life which is very important for their profession and personal life.

2. Research Method

The research method used is Neuroresearch as a form of Mix-Method (qualitative and quantitative research methods) which broadly has 3 (three) stages of research, namely: (a) exploratory research, (b) explanatory and (c) confirmatory (16). First stage, exploratory research is qualitative research through theoretical study (content analysis) of a variable to find theoretical constructs about teacher wellbeing and the quality of work life of teachers. Second stage, the results of exploratory research are then followed by exploratory research as a form of quantitative research whose task is to deepen exploratory research findings to find: (a) the tendency of teacher wellbeing conditions, (b) the most dominant dimension or indicator determining the realization of teacher wellbeing. And the Third Stage, the results of explanatory research are then deepened through confirmatory research (quantitative research) that is analyzing a variety of teacher demographic variables.

Future Face Recognition applications will be built using the Waterfall method as a model of application development sequentially (17,18). Waterfall method is done in stages from requirements definition, system and software design, implementation and unit testing, integration and system testing, and operation and maintenance (17). This method will ensure the correct use of the software so that the application development process can be carried out correctly (18-21).

![Waterfall Model](image.png)
3. Results and Analysis
This research resulted in several important stages in designing face recognition applications.

3.1 Face detection
Face detection is the first step to identify faces or face recognition. An ideal face detector should be able to identify all the faces in an image without paying attention to poses, scale, orientation, age, and expression. Face detection segmentation areas of the face image with the background (background). The alignment process is carried out in order to obtain better and higher accuracy for localization and normalization of facial images. This is because face detection provides the location and scale limits of each detectable face image (2).

3.2 Figure extraction
After the face is normalized, the next step is feature extraction. Feature extraction aims to retrieve effective data for separating and differentiating facial images from one another in a stable manner both geometric and photometric. Face matching through matching features that have been extracted from face images are then trained and tested to produce a face database.

The face image in the database is a representation of pixel arrangement with high dimensions. Face recognition of successful facial images is greatly influenced by visual signals, that is, light reflected on the surface of the face stored by a digital sensor as an arrangement of pixel values (2). This pixel value saves the color or only the intensity of the light. In this stage the challenges of applying face recognition methods are quite large because usually there are some technical difficulties that occur (22).

3.3 Formation of Facial Landmark
Facial landmark is a combination of all parts that can form the edges in connecting landmarks. A more specific structure can produce conclusions that are simpler and more efficient (23).

Examples of implementing landmarks
- For each viewpoint i, we define tree $T_i = (V_i, E_i), i \in \{1,2,\ldots,M\}$. Given a photo of the face $I^H \times W$, the position of landmark $j$ is $s_j = (x_j, y_j) \in S_j \subset \{1,\ldots,H\} \times \{1,\ldots,W\}, j \in \{1,2,\ldots,N\}$. The landmark measurement configuration is $s = (s_1,\ldots,s_N)$ defined by the function $f : I \times S \to \mathbb{R}, S = \{S_1,\ldots,S_N\}$.
- $f_i(l, s) = \sum_{j \in V_i} q_i(l, s_j) + \sum_{(i,j) \in E_i} g_i(s_j, s_k)$
- In Equation (1) the appearance of the function holders $q_i : l \times S_i \to \mathbb{R}, i \in (1, N)$, define as
  $q_i(l, s_j) = \left\{ w^{ij}_j, \Phi_j^iq(I, s_j) \right\}$, indicating how likely are landmarks in a parallel position. For the container the function $g_i$ is the deformation of the form $g_i : S_j \times S_k \to \mathbb{R}, (j,k) \in E$, define as $g_i(s_j, s_k) = \left\{ w^{jg}_{jk}, \Phi_j^{ig}(s_j, s_k) \right\}$, balancing the relative position from neighboring landmarks. $w^{ij}_j$ adalah vektor berat yang menggabungkan fitur descriptor dari penampung j, $\Phi_j^iq(I, s_j), w^{jg}_{jk}$ is a weight vector that combines the descriptor features of container $\Phi_j^{ig}(s_j, s_k) = (dx, dy, dx^2, dy^2)$, $g_i(s_j, s_k) = s_k - s_j$. Squared deformation controls the model with four parameters and can be demonstrated its effectiveness in facial alignment (24).
4. Discussions and Conclusions

Previous studies have detected faces to train the system to simply identify faces. This research, face identification will be trained until it detects a person's inner condition in the form of wellbeing. Because according to several studies found that if a person experiences wellbeing, the quality of his work life increases. That is, by detecting the condition of the heart yourself, a person is able to introspect and organize themselves positively in order to have the best quality work life that ultimately improves the quality of work. Until now there has been no research that specifically addresses the application of Face Recognition for wellbeing. Most of them still explained the procedure and its implementation related to more technical matters such as library and not psychological things (25,26). Therefore this research becomes more interesting because it includes behavioral and psychological elements to be the basis of further research.

Teacher's Quality Work Life is very important for teachers themselves as educators, institutions and the nation and state. Quality work life can be a measure of teacher growth vertically and horizontally along with the growth of the institution. Quality of work life refers to the level of satisfaction, motivation, involvement and commitment experienced by teachers in relation to their lives in the workplace is described through its level of wellbeing. Teachers' interests as individuals are still fulfilled just as they fulfill their work interests. The quality of this fulfillment will be achieved when the teacher has a prosperous condition, both physically and psychologically known as Wellbeing. Wellbeing condition is a fluctuating condition, because it has various trigger factors. Therefore optimizing it requires a Face Recognition-based application that can be used as a self diagnostic on an ongoing basis to monitor wellbeing conditions that optimize the quality of teacher's life.

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