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**INFORMATION ON NEW ACADEMIC AND THEORETICAL
CONTRIBUTIONS OF THE THESIS**

Thesis's Title: Some Facial Expression Recognition Techniques for Assessing Learner Engagement

Major: Computer science

Code: 9480101

PhD Candidate: Tran Thanh Phuong

Course: 2015

University: Lac Hong University

Science Instructor Group:

- Science Instructor 1: Assoc. Prof. Do Nang Toan
- Science Instructor 2: Ph.D. Lam Thanh Hien

The contributions of thesis on science and practice, including:

Scientifically:

With the aim of applying computer vision methods to automate the analysis of learning activities, providing valuable information for teachers during the teaching process and students' learning journey, the research results presented below constitute the contributions of the thesis, including:

- Introducing a method to assess the level of learner engagement based on eye-open/closed behavior. The evaluation process of concentration is examined and analyzed throughout the learner's educational journey. Initially, the method evaluates at individual time points, then aggregates and calculates the proportion of each state compared to the entire process (as during the learning process, learners may exhibit varying degrees of engagement at different times).
- Improving the technique for detecting eye-open/closed states with a dynamically determined threshold suitable for all subjects. Due to the unique characteristics of each individual's eyes, the height and width of the eyes vary. Therefore, using a fixed threshold for determination may not cover all cases.
- Techniques for decomposing facial expressions into basic components to address the issue of rare training data. During the learning process, learners continuously receive information from teachers, friends, environmental influences, etc. Therefore, the emotions of learners vary at each moment, and they can be a mixture or a single expression, resulting in corresponding distortions in emotional representation.

Practically:

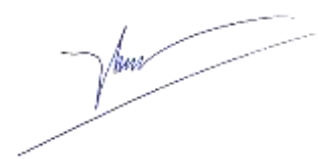
Automated learning analysis is an essential concern in the field of education and training. Especially, the increasing prevalence of numerous courses and online learning systems. This poses a challenge for educators in monitoring the learning behavior of students in large class or on a monitor with online learning. Therefore, the research findings of the thesis serve as a crucial foundation, aiding educational institutions and teachers in promptly grasping the learning dynamics of students. Consequently, it enables reasonable adjustments to academic regulations, improvements to training programs, curriculum, lectures, and pedagogical methods to enhance the quality of education and academic outcomes for students. Simultaneously, it facilitates a swift response to emerging challenges within the education sector.

Dong Nai, date 11 month 12 year 2023

SCIENCE INSTRUCTOR 1

SCIENCE INSTRUCTOR 2

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