様式 7

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学位論文題目	Supporting Ubiquitous Learning Using Life-log Camera 「ライフログカメラを用いたユビキタス学習支援環境の研究」

内容要旨

This doctoral dissertation proposed a method on building a passive environment to support ubiquitous learning using life-log camera. However, life-log camera usually takes too many photos but few photos are valuable to be used as ULLOs. Therefore, we designed and developed a system named PACALL to help learners find out learning contents from life-log photos. This system supports learner in following way:

1. Analyze life-log photos, filter bad photos and recommend good photos for learner in order to reduce learner's workload.
2. Help learner have a reflection of what they have learned in one day.
3. Increase the chance of learning.
4. Help learner upload life-log photos as ULLOs.

In this study, we use image processing to analyze and classify photos. CBIR is also used to find similar ULLOs that exist in SCROLL system to help learner make further learning.

Three kinds of evaluations were conducted in this study.

Evaluation I compares passive mode to active mode. We used the original mode in SCROLL - recording ULLOs by tablet PC/camera as active mode. The result confirms that passive mode - recording ULLOs by life-log camera helps learner register more ULLOs and increase the chances of learning. But the quality of life-log photos is lower than common photos. Besides, most learners felt ashamed when using SenseCam in public. We think this problem is caused by two reason - one is the design of SenseCam, and another is learners were worried about the privacy problem.

Evaluation II was conducted to help us evaluate the algorithm of image processing. The result shows how PACALL reduce learner's workload by photo classification and photo recommendation. In addition, the result in this evaluation also suggests that algorithm of image processing in passive learning environment is very important.

Evaluation III was conducted to analyze learner's learning activities in passive learning environment by using quantitative method. Especially, this evaluation shows how PACALL help learner learn in passive learning environment by meta-knowledge model.

Current PACALL system supports NMEA GPS data format. However, because of the current device, we have not conducted the evaluation experiment by using GPS data. This is one of our future works. Another future work is learning analytics. We want to analyze the accumulated data of learning logs to find leaners' learning patterns and learning habits in order to supply more appropriate learning materials at more appropriate place and more appropriate time to improve learning effects. In addition, the algorithm of image processing also needs improvements.

様式9

<p align="center">論文審査の結果の要旨</p>

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学位論文題目

Supporting Ubiquitous Learning Using Life-log Camera
ライフログカメラを用いたユビキタス学習支援環境の研究

審査結果の要旨

　本研究は、ライフログカメラを用いることによって、日常生活において、至る所で起こる学習の機会を記録するための環境を提案する。特に、１日数千枚の多くの写真に対して、重要度を付与し、写真を分類する方法を提案した。これによって、振り返りの学習における作業負担を軽減した。Web上にシステムを開発し、評価実験にも成功している。

　以上、本研究は，ライフログカメラを用いた学習支援に関する研究であり，本論文は博士（工学）の学位授与に値するものと判定する。