ULearn: Understanding Student Engagement/Emotion/Frustration using ML

Abstract

The goal of this work is to provide feedback to students regarding their engagement/emotion/frustration while utilizing web-based instructional material using computer vision and machine learning techniques. An Android Application will be developed that will present a simple user interface of a web-browser to the student. Based on computer vision machine learning the students facial expressions are interpreted. If the student seems to be experiencing frustration or anger the user is presented with a pop up giving different suggestions. If the corresponding web page has title, keywords and meta description tags those will be used to form Google search links or wikipedia links. Future versions will explore the use of Google NPL Text analysis or other web services for AI based tip generation.
Concept

Running Mode - no frustration sensed

Student based View - “frustrated” case
Diagnostic Mode - “happy”

ULearn  "show how YOU learn"

Diagnostic Mode - “frustrated”

ULearn  "show how YOU learn"
## Versions

**Version 1 - short 2 week deadline**
Implement as above and choose either Version 1.A or Version 1.B based on availability:

- **Version 1.A**: utilize tensorflow CNN
- **Version 1.B**: utilize Google Cloud Face Detection service

**Version 2**
In addition to version 1, add some kind of customization where faculty can in head section of HTML provide custom tips for this - maybe description is enough but, could look at more elaborate options

**Version 3**
Enhanced training - more time and/or with additional data beyond FER2013

**Version 4**
Integrate NLP semantic understanding for a AI approach to generation of tips

## How it Works

![Diagram](image)

## General Issues
This is a proof of concept idea and would need to be tested at the University as a research project. Providing similar links to material use Google Search API is a challenging problem and involves Natural Language Understanding which is an unsolved research problem.

**Budget Issues**

Use of Google services both NLP and Vision are not free