**ULearn: Understanding Student Engagement/Emotion/Frustration using ML**

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**Abstract**

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| 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. |

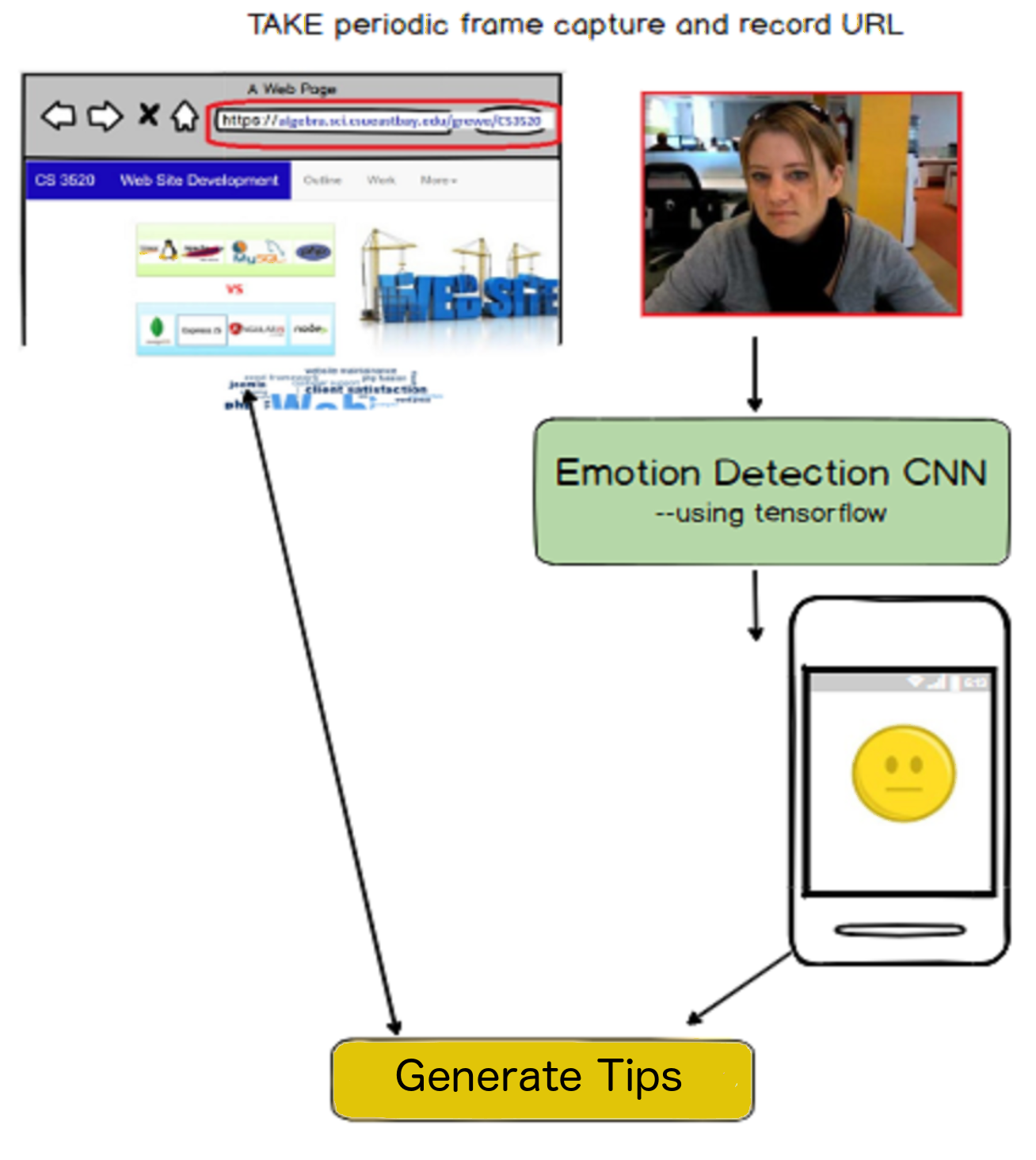
**Concept**

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| **Running Mode - no frustration sensed** |
| **Student based View - “frustrated” case** |
| **Diagnostic Mode - “happy”** |
| **Diagnostic Mode - “frustrated”** |

**Versions**

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| **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**

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**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