**Senior Project Proposal**

**Background**:

I am currently pursuing a major in Data Science. After graduation, I plan to move back to Sterling, Virginia, and work as a Data Scientist for Noblis. I have successfully completed CS 450 and am currently enrolled in MATH 425 and MATH 488 this semester. My school email is [tow22001@byui.edu](mailto:tow22001@byui.edu).

**Project Description:**

I want to create a tool that analyzes an image and generates a short caption describing it. This tool can help visually impaired individuals understand pictures and automate tasks like tagging photos or creating captions for social media. I plan to use a dataset such as MS-COCO or Flickr8k, which contain thousands of images paired with captions, to train the model.

**Domain to Investigate:**

There are two main areas I need to study for this project:

1. Neural Network Models
   * Learn how to better use Convolutional Neural Networks (CNNs) to pull features from an image, like identifying objects or parts of a scene.
2. Natural Language Processing (NLP)
   * Work on models like LSTMs (Long Short-Term Memory) or Transformers to generate sentences.
   * Learn how to connect visual features from the image to meaningful words and phrases.

**Project Deliverables:**

 Cleaned Data: Get the dataset ready by organizing pictures and captions.

 Working Model: A part that looks at pictures (CNN) and a part that writes captions (LSTM/Transformer).

 Performance Check: Test how good the captions are

 Interactive Demo: A tool where someone can upload a picture, and it shows the caption.

 Visuals: Simple graphs to explain how the model works and where it focuses in the image.

 Write-Up: A short explanation of how the project works and why it’s useful.

**Faculty Request:**

J. Hathaway