# Depression, Anxiety, Stress, Suicide (DASS)

# Feature Generation Protocol

Protocol created based on past research (Saha et al., 2018, 2019; Saha & De Choudhury, 2017).

## Downloading and Preprocessing the Data

1. Download social media data to serve as positive examples of DASS.
   1. Download archival Reddit data (2015–2019) from Google BigQuery for r/depression, r/Stress, r/Anxiety, and r/SuicideWatch.
   2. Download ~10,000 recent Reddit data (2021–2022) from Pushshift.io for r/depression, r/Stress, r/Anxiety, and r/SuicideWatch.
2. Download social media data to serve as negative examples of DASS.
   1. Download archival Reddit data (2015–2019) from Google BigQuery for r/movies, r/aww, and r/askscience.
3. Clean the text data (e.g., remove links, etc.).
4. Create balanced datasets for each DASS construct with a 1:1 label ratio.
   1. Randomly select positive examples of the construct (e.g., Reddit posts from r/depression).
   2. Randomly select negative examples (e.g., Reddit posts from r/movies, r/aww, and r/askscience).
   3. Combine the data into a data frame.
5. Save the four DASS datasets.

## Generating DASS n-grams

1. Create unigrams, bigrams, and trigrams for each DASS dataset.
   1. Tokenize the data (*n* = 1, 2, 3).
   2. Remove stop words using different dictionaries.
2. Calculate TF-IDF.
3. Arrange the n-gram data frames is descending order by TF-IDF.
4. Filter the data frames for positive examples only (e.g., bigrams for the depression Reddit posts).
5. Specify number of n-grams to extract (*N* = 5,400).
   1. Depression, Anxiety = 550 unigrams, 550 bigrams, 550 trigrams.
      1. Note: more n-grams extracted due to these two conditions being most common mental health concerns in general population.
   2. Suicide = 500 unigrams, 500 bigrams, 500 trigrams.
   3. Stress = 200 unigrams, 200 bigrams, 200 trigrams.
      1. Note: fewer n-grams extracted due to low-quality stress Reddit posts (i.e., within top 100 n-grams, words were in German or discussing research advertisements).
6. Perform quality assurance.
   1. Examine the n-grams to remove nonsense words or netspeak.
7. Ensure number of n-grams was updated after quality assurance.
8. Save positive n-grams.

## Training the DASS Classifier

1. Generate features for the datasets.
   1. For each DASS dataset, generate features using the n-grams. Each n-gram serves as a feature.
      1. Depression = 1,650 features.
      2. Anxiety = 1,650 features.
      3. Stress = 600 features.
      4. Suicide = 1,500.
   2. Perform string detection using regular expressions to determine if the n-gram is present in the Reddit post. If the n-gram is present, then record 1 in the n-gram column, otherwise record 0.
2. Split the datasets into training (.80) and test (.20) sets.
3. Train a SVM classifier for each dataset (i.e., a depression classifier, an anxiety classifier).
   1. Start with hyperparameters in (Saha et al., 2019).
   2. Perform k-fold cross-validation.

## Generating DASS Features for Gender Dysphoria Datasets

1. Use each SVM classifier to automatically label the gender dysphoria datasets.
   1. Labels serve as features.
   2. Adds four features to the gender dysphoria datasets, one for each DASS classifier.