

CSE 3521
Homework 6 - Experimental Design

Due 12/1 at 11:59pm

Learning Goals The goal of this assignment is for you to gain practical experience designing your own experiments to evaluate a claim. I'm looking for evidence that you understand the process, not an implementation.

Submission Instructions Please either bring answers on paper to class on 12/1 or submit electronic answers to these questions (in PDF form) via Carmen.

You've designed an awesome new neural network model for classifying the language a tweet is written in, and you're going to sell it to Twitter for truckloads of money. First, though, you have to demonstrate how great your model is. So, you've hired a bunch of other students to translate tweets from English and French into Arabic and Mandarin. Your dataset looks like this:

		Target	
		Arabic	Mandarin
Source	English	10,000	15,000
	French	6,500	22,000

Your friend and rival down the hall developed the current best model for classifying tweet languages. You want to show that your way is better, so you're going to use your rival's model as your baseline.

Your claim is: **your new model will outperform your rival's model on classifying the language a tweet was written in.**

Given this claim, answer the following questions to design an experiment to help evaluate it.

- (2 points) State **ONE** testable hypothesis related to your claim. (*Remember that your claim may break down into multiple hypotheses; you only need to give one here.*)
 - As an example, see how my claim about classifying EHR documents broke down into 3 testable hypotheses.
- (5 points) State at least two variables in your dataset or experiment that you will need to control for in order to test for the effect you're interested in, and explain why you need to control for each one. (1-2 sentences per variable)
 - As an example, for document classification, I needed to control for which hospital the data came from and the balance between *Rehab* and \neg *Rehab* documents in the training and test sets.

3. (8 points) For your hypothesis, and given the variables you need to control for, answer the following questions (1-2 sentences each).
- (a) How will you select your training data?
 - (b) How will you select your testing data?
 - (c) What model or models will you learn on the training data?
 - (d) What model or models will evaluate on the testing data?
4. (6 points) Using your answers to Question 3, design an experimental procedure for getting from the data you have to a result. Explain how this procedure controls for the variables you identified in Question 2. (1-2 paragraphs)
- If you would need multiple experiments to test your hypothesis (as I needed for the document classification example), please explain the different experimental settings you would need.
- Note you do **not** need to talk about how you'll generate features from the data. Assume that your awesome new model will do this for you.
5. (4 points) Will the results from your experiment give you all the evidence you need to support or reject your claim? Justify why or why not. (3-4 sentences)