Hypothesis (Problem Statement): Can we build a classification model in 2021 which will:
-Allow Pokemon creators (officially at the Pokemon Company and unofficially at Smogon) to predict with maximum accuracy what competitive Smogon tier a given pokemon (current or future) will be nearest to
-Give Pokemon creators, as well as more technical and competitive players, an understanding of the key features (or combinations of features) that make for a competitively viable pokemon

Context: Pokemon is a very popular video game in which there are 898 different creatures (called pokemon) which the player can collect and use to battle against other players in 6 versus 6 turn-based pokemon battles (one vs one pokemon at a time). What's important is that these pokemon have certain features that can make them more or less powerful, such as base stats (attack, defense, speed, etc.), type(s), passive abilities, as well as different "moves" of various types and styles that each pokemon can use on their turn (they only can have access to 4 moves in a given battle which can't be changed during the battle, but usually have many more than 4 possible moves that they can learn or select before a battle). Smogon, the most comprehensive resource on competitive pokemon battling, has aggregated various competitive tiers of pokemon which cannot be played at lower tiers. This allows less competitive pokemon the chance to be played at lower tiers without having the game over-centralized around several pokemon (which would make the game boring and stale). While pokemon at lower tiers can be used in any higher tier, this is rarer and more situational; the pokemon represented in each tier are those that are determined statistically (based on specific cutoffs like being 50% likely to encounter the pokemon in 15 battles within the tier) to be most used within each tier by competitive players. The tier lists are given minor updates every month and major updates every three months to keep them accurate to current statistical usage, since pokemon can have a changing "meta-game" that requires evolving strategies. The Pokemon company comes out with new pokemon generations every several years and it would be valuable for them to have some guidelines to control how competitively powerful each pokemon they release is likely to be. With greater ease in balancing a new set of Pokemon, game quality and sales possibilities will be increased while development time will be lowered. It will also give competitive pokemon players a more data-driven way (more stable than current tier lists) to make decisions about which pokemon (or which features of pokemon) they may want to spend time cultivating; training pokemon can be a time consuming task with an overwhelming array of choices.

Criteria: This project will be finished when by the given deadline we've trained the most accurate classification model possible to predict the nearest Smogon tier of any given pokemon. We'll inquire into the set of features (or combinations of features) of our best model, which can then be used to advise pokemon creators and competitive players on which feature combinations most relate to the competitive viability of a pokemon.

Scope: We are specifically analyzing the features and competitive tiers of Pokemon in their 8th generation version; it has the most easily accessible competitive data, it has the largest number of pokemon, and it will likely be the closest in approximation to any future generations so the most useful for predicting anything regarding them. This model will not work for versions of pokemon from earlier generations due to the different rules they operate by. We will only be

analyzing the standard tiers which operate with 6 versus 6 singles battles: double battles, little cup (though we can include Little Cup pokemon in the lowest competitive tier as they are allowed to be used in standard battles and occasionally climb into higher tiers), anything goes, national dex modes, etc. will not be included. This is because the Smogon 6 versus 6 has the most comprehensive competitive pokemon data and gives us a standard ruleset to ensure fairness. This means that transformed modes of pokemon such as Mega, Dynamax and Crowned are banned since they mostly belong to excluded tiers, are difficult to represent, and don't play within the rules. We won't model aspects that aren't static features of Pokemon but which competitive players need to consider such as items, natures, EVs, and IVs, though these may have an indirect influence since pokemon that synergize well with them might score higher in certain tiers. Analysis might consider it later, but the static stats are what synergize with it.

Constraints: Since we need to get things like competitive movesets, we're going to have to web scrape data off of Smogon and other pokemon websites, which might take some effort. It will be easiest to start with the current tiers in the competitive scene. We'll have to decide where to place nonstandard tiers like Little Cup, Zero Used, and Untiered; it might make sense to aggregate them into one bottom tier under PU, but this tier will be much larger than the others. Banlist pokemon likely should not be included in their current tier since they are deemed too powerful for it: it will make more sense to put them in the tier above since they can actually be used there. This is how it works for Over Used anyways (Ubers, the highest tier, is the Over Used banlist), and such tier shifts from banlist to the next highest tier are usually considered trivial by the website. Pokemon metas are changing and have a lot of interdependencies based on the development of new strategies or how often counters are being used, so this project won't be a perfect measure of tier at any given time. However, most of the tier is stable at most times, so it is clearly somewhat systematic and having a model that gives an even more stable measure than just the current tier could be useful (so our model measures something more like "average tier potential" in order of likelihood). It is also likely combinations of features, more than individual features, that give a pokemon competitive viability, so we want a model that measures such feature combinations well: this could mean something like random forest, or it could mean feature engineering, which may require studying the different competitive roles pokemon play so that good features can be designed.

Stakeholders: the Pokemon company, the Smogon competitive battling community, Smogon "Create a pokemon" participants, technically minded pokemon players

Datasets: The Smogon website has all the data needed for pokemon features and competitive tiers, in addition to websites like Serebii, Bulbapedia, Pokemon API, Kaggle and Data World if more data is needed (though most Kaggle and Data World sets are outdated for our purpose).