Pokémon
BATTLE PREDICTOR ™

Travis Cook
Matthew Groh
Marshal Rittenger

POKÉMON

Video Game

- Handheld video game
- Head-to-head battle
- Each Pokémon has unique stats and abilities.

POKÉMON DATA SET

Battles

	First_pokemon	Second_pokemon	Winner
0	266	298	298
1	702	701	701
2	191	668	668
3	237	683	683
4	151	231	151

Pokémon Stats

	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Generation	Mythical	Legendary
0	1	Bulbasaur	Grass	Poison	45	49	49	65	65	45	1	0	0
1	2	Ivysaur	Grass	Poison	60	62	63	80	80	60	1	0	0
2	3	Venusaur	Grass	Poison	80	82	83	100	100	80	1	0	0
3	5	Charmander	Fire	None	39	52	43	60	50	65	1	0	0
4	6	Charmeleon	Fire	None	58	64	58	80	65	80	1	0	0

ETL Data Prep

Combined Battle Data

	match_id	first	first_name	first_type_1	first_type_2	first_hp	first_attack	first_defense	first_sp_atk	first_sp_def	...	second_hp	second_attack	second_defense	second_sp_atk	second_sp_def	second_speed	second_generatio
0	1	266	Larvitar	Rock	Ground	50	64	50	45	50	...	70	70	40	60	40	60	
1	2	702	Virizion	Grass	Fighting	91	90	72	90	129	...	91	129	90	72	90	108	
2	3	191	Togetic	Fairy	Flying	55	40	85	80	105	...	75	75	75	125	95	40	
3	4	237	Slugma	Fire	NaN	40	40	40	70	40	...	77	120	90	60	90	48	
4	5	151	Omastar	Rock	Water	70	60	125	115	70	...	20	10	230	10	230	5	

Finalized Battle Data

|	first_effectiveness	first_hp	first_attack	first_defense	first_sp_atk	first_sp_def	first_speed	first_mythical	first_legendary	second_effectiveness	second_hp	second_attack	second_defense	second_sp_atk	second_sp_def	secon
0	0.5	50	64	50	45	50	41	0	0	4.0	70	70	40	60	40	
1	4.0	91	90	72	90	129	108	0	1	0.5	91	129	90	72	90	
2	1.0	55	40	85	80	105	40	0	0	1.0	75	75	75	125	95	
3	0.5	40	40	40	70	40	20	0	0	1.0	77	120	90	60	90	
4	4.0	70	60	125	115	70	55	0	0	1.0	20	10	230	10	230	

RANDOM FOREST

- Features (independent variables) most important to the Random Forest model.

- Features reduced to improve accuracy.

Features Importances
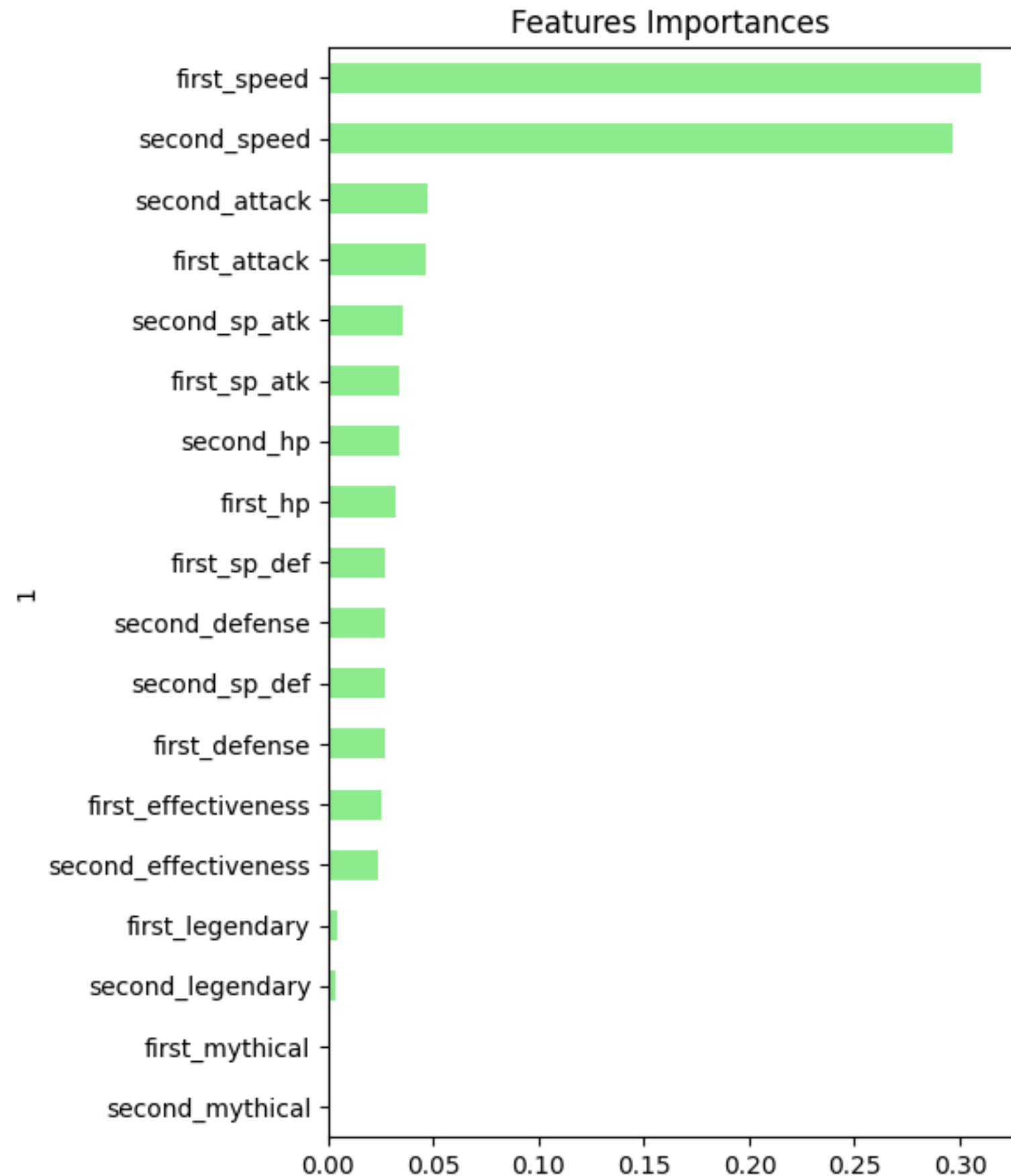
RANDOM FOREST

Randomized Search

```
...    {'bootstrap': [True, False],
       'max_depth': [50, 60, 70, 80, 90, 100, None],
       'max_features': ['log2', 'sqrt'],
       'min_samples_leaf': [1, 2, 4],
       'min_samples_split': [2, 5, 10],
       'n_estimators': [1000, 1250, 1500, 1750, 2000]}
```
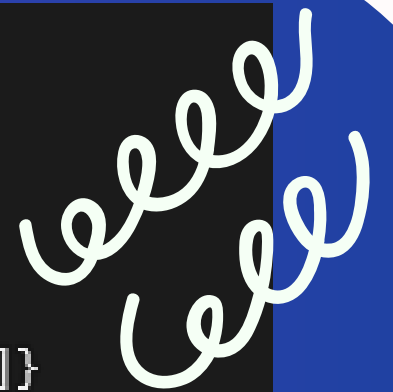
Grid Search

```
param_grid = {
    'bootstrap': [True],
    'max_depth': [55, 60, 65],
    'max_features': ['sqrt'],
    'min_samples_leaf': [1],
    'min_samples_split': [2, 3],
    'n_estimators': [1400, 1500, 1600]
}
```

NEURAL NETWORK

Randomized Search

```python
param_dist = {
    'optimizer': ['adam', 'rmsprop'],
    'activation': ['relu', 'LeakyReLU'],
    'neurons': [32, 64, 128, 256],
    'layers': [1, 2, 3],
    'epochs': [50, 100, 150]
}
```

Grid Search

```python
param_grid = {
    'optimizer': ['adam'],
    'activation': ['relu'],
    'neurons': [256],
    'layers': [1, 2, 3],
    'epochs': [25, 50, 75]
}
```
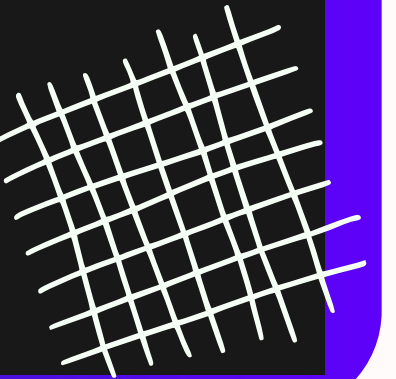
POTENTIAL ENHANCEMENTS

- Updated Pokémon generations
- Pokémon move data
- Search for different models
- Explore other optimization methods