



# Palworld Combat Effectiveness Analysis

Predicting Combat Power &  
Identifying Undervalued Pals

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# Project Overview

**Research Question:** *"What combination of features best predicts combat effectiveness, and can we identify undervalued Pals that outperform their rarity?"*

## Why This Matters:

- Help players build optimal combat teams
- Find hidden gems without chasing Legendary Pals
- Understand what makes Pals effective in battle



# What We Expected to Find

## Before starting, we hypothesized:

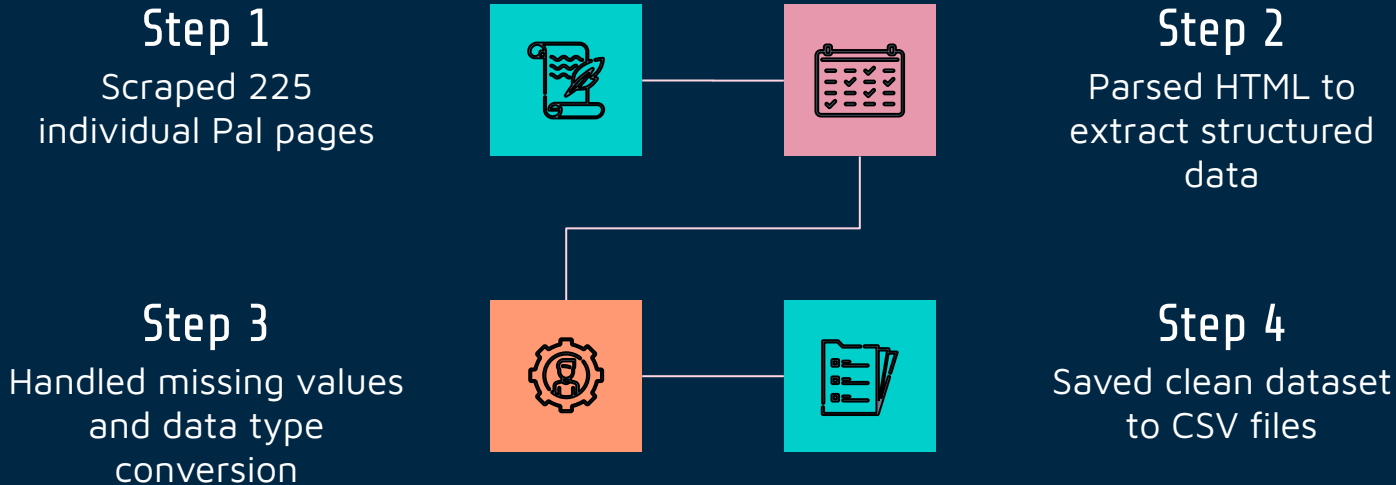
- Higher rarity = better combat performance
- Combat stats (HP, Attack, Defense) are primary predictors
- Some lower-rarity Pals might punch above their weight
- Work capabilities might trade off with combat power

**Goal:** Test these assumptions with real data

# How We Got Our Data

**Source:** palworld.gg database

**Method:** Python web scraping with BeautifulSoup



**Challenge:** Fixed element parsing bug through iterative debugging

# What Data We Analyzed

**Dataset Size:** 225 Pals **8 Key Features:**

Name, Rarity  
(Common/Rare/Epic/Legendary)

Combat Stats: HP,  
Attack, Defense

Primary Element (Fire,  
Water, Leaf, etc.)

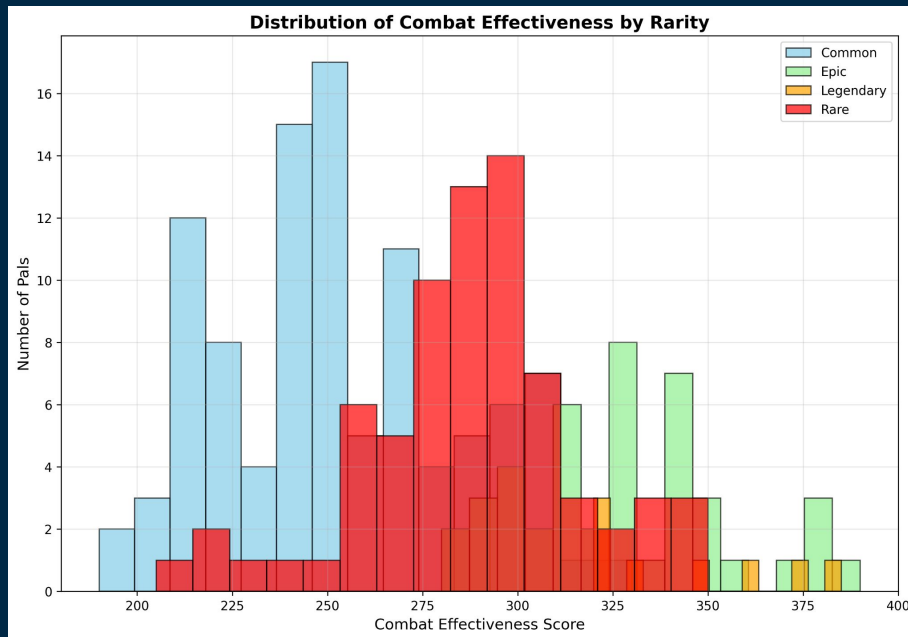
Work Types &  
Partner Skills

**Target Variable:**  $\text{Combat Score} = \text{HP} + \text{Attack} + \text{Defense}$   
**Data Quality:** <2% missing values, all properly cleaned

# Combat Power Varies Within Rarity Groups

**Key Insight:** Significant overlap between rarity categories **What This Means:**

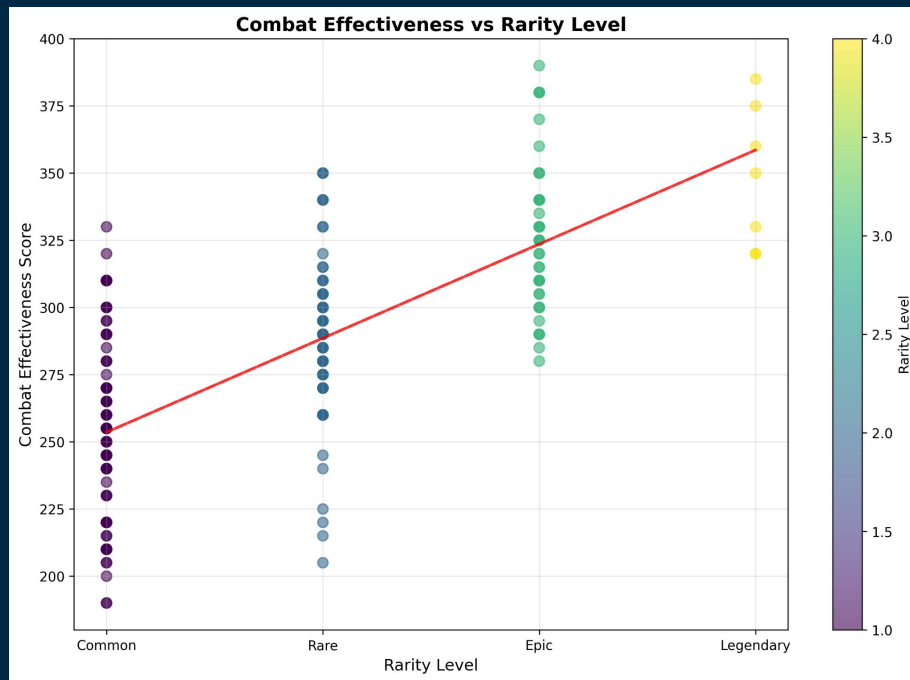
- Some Common Pals have higher combat scores than Epics
- Rarity alone doesn't determine fighting ability
- There's opportunity to find undervalued fighters
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# Higher Rarity Correlates with Combat Power (But Not Perfectly)

## Key Findings:

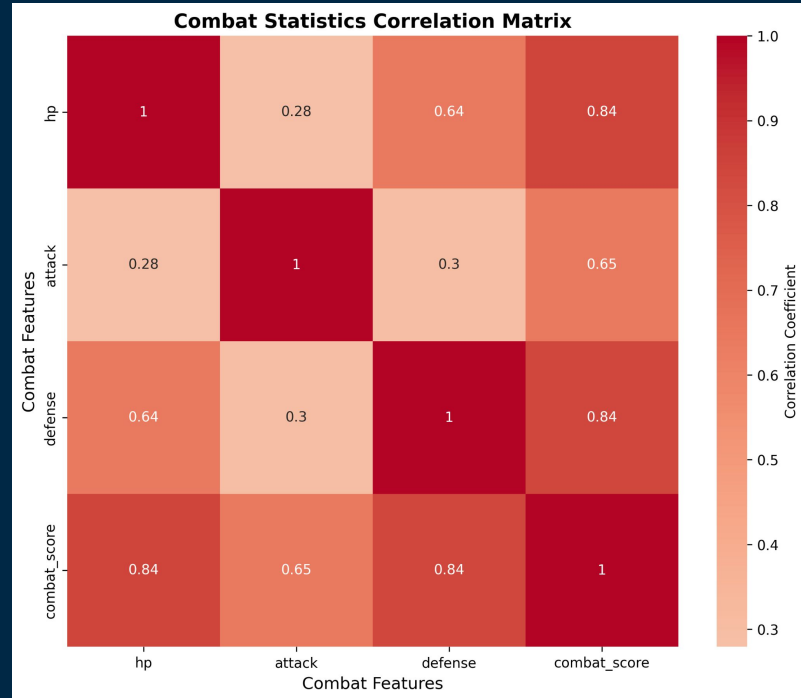
- Positive correlation between rarity and combat score
- Lots of variance around the trend line
- Many Pals above/below expected performance
- This variance is where we find hidden gems



# HP, Attack, and Defense Work Together

## Key Insights:

- Combat stats are moderately correlated (0.3-0.5)
- Each stat contributes independently to combat effectiveness
- Strong correlation with our combat score validates the approach
- No single stat dominates - balance matters

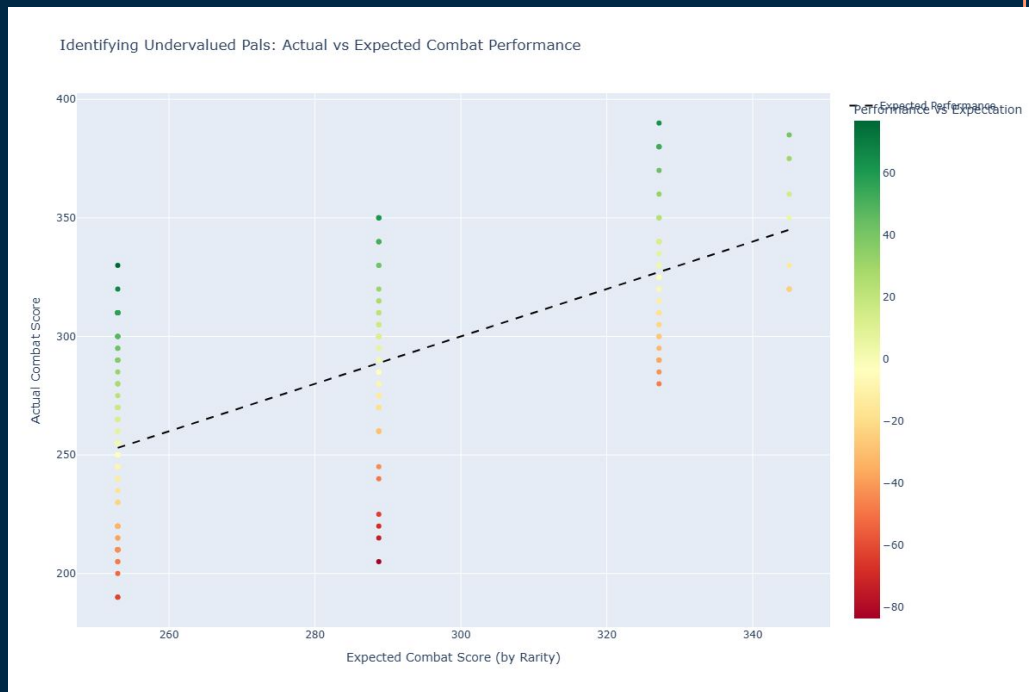




# Found Hidden Combat Gems!

## Top Undervalued Pals Discovered:

- **Shadowbeak** (Epic performing at Legendary level)
- **Cryolinx** (Epic punching above weight)
- **Incineram** (Rare with Epic-level combat power)
- **Palumba** (Another undervalued gem)



# Why We Chose These Approaches

## Model 1: Linear Regression

- **Purpose:** Predict combat score from all 8 features
- **Why:** Test which features matter most for combat

## Model 2: K-Means Clustering (K=4)

- **Purpose:** Group Pals by combat characteristics
- **Why:** Discover natural combat archetypes
- **K Selection:** Elbow method confirmed K=4 optimal

# What Our Models Revealed

## Linear Regression Results:

- **$R^2 = 0.99$**  (near-perfect prediction!)
- **Key finding:** Combat stats (HP/Attack/Defense) dominate
- **Other features:** Minimal impact on combat effectiveness

## K-Means Clustering Results:

- **4 distinct combat archetypes identified:**
  - Tanks (High HP/Defense)
  - Glass Cannons (High Attack)
  - Balanced Fighters
  - Support/Weak Pals

# What We Learned & What's Next

## Main Conclusions:

- Combat effectiveness is highly predictable from base stats
- **Undervalued Pals exist** - players can find powerful fighters without chasing Legendaries
- **4 distinct combat archetypes** provide framework for team building

## Future Enhancements:

- Evolution chain data
- Active skills and damage multipliers
- Breeding compatibility analysis
- Seasonal/event Pal variations

# Questions?