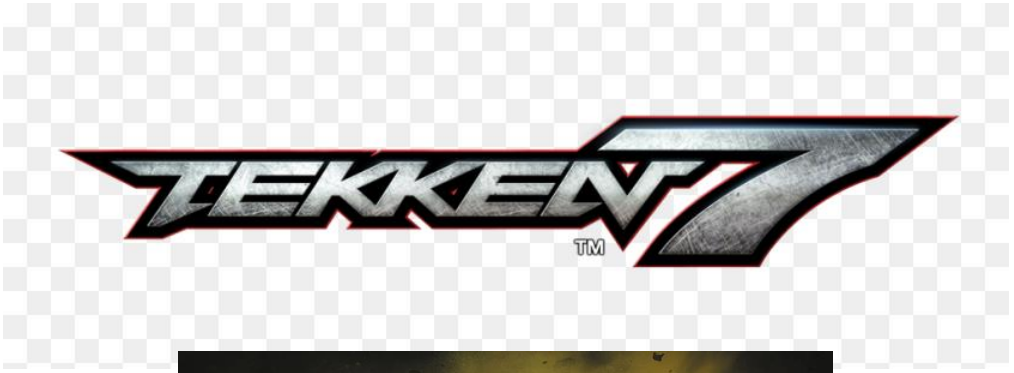
Rating System

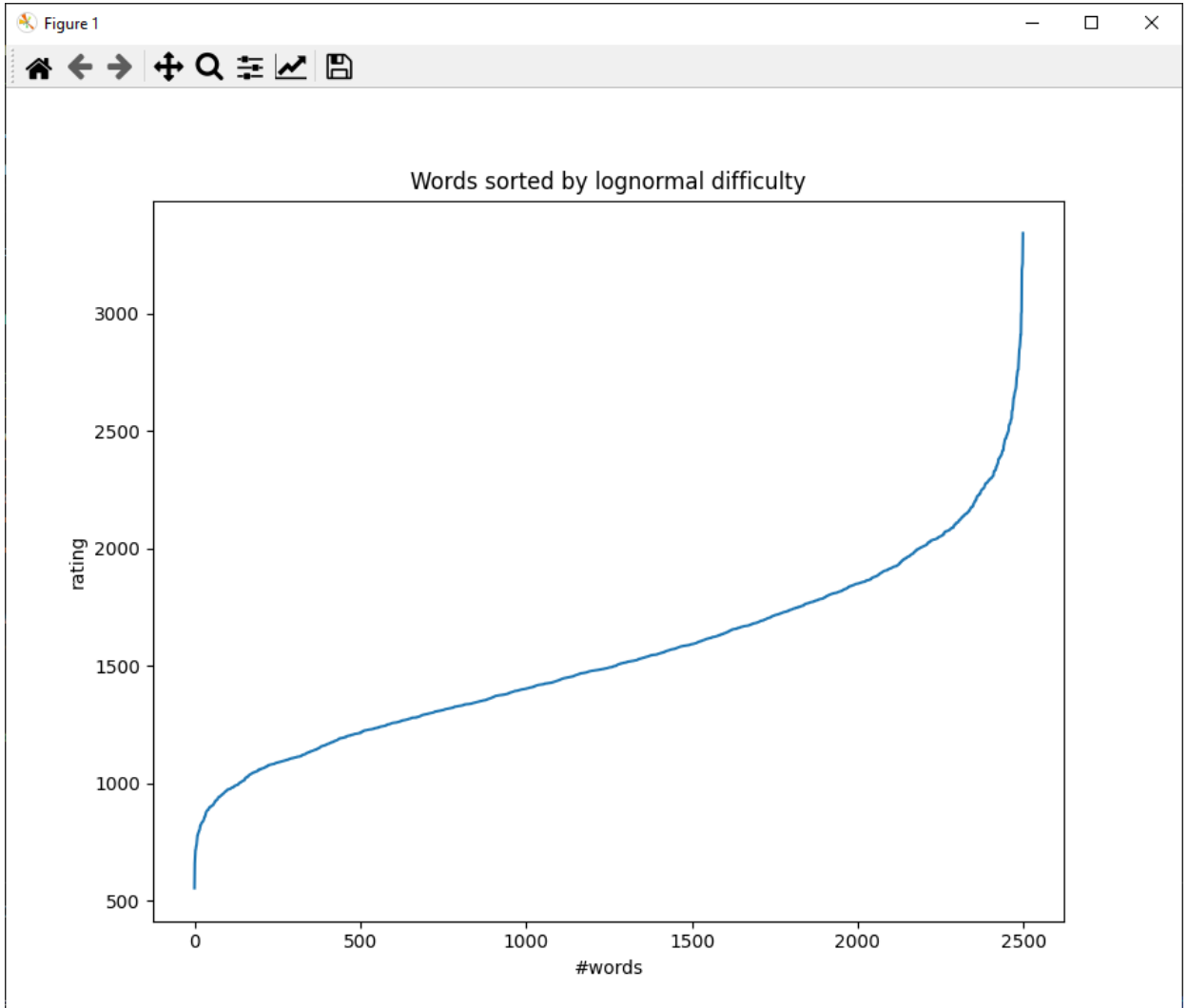
Many online pvp games



Balancing is crucial

For player i of rating R_i dueling against j of rating R_j, with words of each of their own being w_i and w_j, we have the following:

To begin with, player's initial rating is set as 1500, each words's rating lognormal distributed at $Lognormal \sim (log(1500), 0.25^2)$.



We define the winrate of i winning against j as:

$$E(P_{i,j}) = \frac{1}{1 + 10^{(R_j - R_i)/400}} \tag{1}$$

Then, the new Rating of i is:

$$R_i^{'} = R_i + \epsilon(I_{result} - \sqrt{E_{i,j}E_{i,w_i}}) \tag{2}$$

where ϵ equals to 0.05.
Update function of word w_i is similar,

$$E(P_{i,w}) = \frac{1}{1 + 10^{(R_w - R_i)/400}} \tag{3}$$

$$R_i^{'} = R_i + \epsilon(I_{result} - E_{w_i,i}) \tag{4}$$