

# CSCI3100 Avlanche Rating System Documentations\*

Group B2

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\*Work in progress, subject to change.

## Abstract

A rating system proposed for the player-to-player+word, word-to-player dynamic rating system, inspired from codeforces' elo system.

## 1 Motivation

Fillin later...

## 2 Formulation

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 randomly normal distributed at  $N \sim (1500, 1)$ .

We define the winrate of  $i$  winning against  $j$  as:

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

Then, the new Rating of  $i$  is:

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

Update function of word  $w_i$  is similar,

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