

ELO-Model-Amber

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4/23/2021

Import Data

GameLogs from 2000 to 2020

```
gamelogs <- read.csv("data/gamelogs2000-2020.csv")
```

Glimpse Data

GameLogs from 2000 to 2020

```
glimpse(gamelogs)
```

```
## Rows: 49,486
## Columns: 161
## $ column_a <chr> "3/29/00", "3/30/00", "4/3/00", "4/3/00", "4/3/00", "4/3/...
## $ column_b <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ column_c <chr> "Wed", "Thu", "Mon", "Mon", "Mon", "Mon", "Mon", "Mon", "Mon", "...
## $ column_d <chr> "CHN", "NYN", "COL", "MIL", "SFN", "LAN", "SDN", "CHN", "...
## $ column_e <chr> "NL", "NL", "NL", "NL", "NL", "NL", "NL", "NL", "AL", "AL...
## $ column_f <int> 1, 2, 1, 1, 1, 1, 3, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, ...
## $ column_g <chr> "NYN", "CHN", "ATL", "CIN", "FLO", "MON", "NYN", "SLN", "...
## $ column_h <chr> "NL", "NL", "NL", "NL", "NL", "NL", "NL", "NL", "AL", "AL...
## $ column_i <int> 1, 2, 1, 1, 1, 1, 3, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, ...
## $ column_j <int> 5, 5, 0, 3, 4, 10, 1, 1, 3, 4, 7, 7, 4, 4, 4, 5, 5, 3, 10...
## $ column_k <int> 3, 1, 2, 3, 6, 4, 2, 7, 2, 1, 0, 4, 10, 5, 6, 3, 1, 0, 4,...
## $ column_l <int> 54, 66, 51, 31, 51, 54, 51, 51, 54, 54, 54, 54, 51, 53, 5...
## $ column_m <chr> "N", "N", "D", "D", "N", "N", "D", "D", "N", "D", "N", "N...
## $ column_n <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "...
## $ column_o <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N...
## $ column_p <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "...
## $ column_q <chr> "TOK01", "TOK01", "ATL02", "CIN08", "MIA01", "MON02", "NY...
## $ column_r <int> 55000, 55000, 42255, 55596, 35101, 51249, 52308, 48156, 4...
## $ column_s <int> 206, 235, 134, 111, 166, 157, 144, 174, 182, 187, 170, 19...
## $ column_t <chr> "100010210", "1000004", "0", "2100", "2100001", "10040500...
## $ column_u <chr> "1000020", "1000000", "00000020x", "21000x", "20002101x",...
## $ column_v <int> 33, 37, 31, 22, 35, 38, 31, 27, 32, 33, 39, 39, 34, 36, 3...
## $ column_w <int> 12, 6, 6, 7, 10, 9, 5, 3, 6, 6, 14, 11, 10, 9, 6, 11, 10,...
## $ column_x <int> 1, 2, 2, 1, 2, 0, 0, 1, 0, 0, 2, 4, 1, 2, 1, 4, 1, 0, 3, ...
## $ column_y <int> 0, 0, 0, 0, 2, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, ...
## $ column_z <int> 2, 1, 0, 0, 1, 2, 1, 0, 2, 2, 2, 1, 0, 0, 2, 0, 2, 1, 2, ...
## $ column_aa <int> 5, 5, 0, 2, 4, 9, 1, 1, 3, 4, 7, 4, 2, 4, 4, 5, 5, 3, 9, ...
## $ column_ab <int> 1, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0, ...
## $ column_ac <int> 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 2, 1, ...
## $ column_ad <int> 1, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, ...
```

```

## $ column_ae <int> 10, 8, 2, 5, 1, 4, 0, 3, 3, 2, 0, 6, 2, 1, 3, 5, 5, 5, 2,...
## $ column_af <int> 0, 0, 2, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 2, 0, 0, 0, ...
## $ column_ag <int> 5, 5, 7, 1, 8, 4, 8, 7, 3, 7, 6, 10, 1, 9, 10, 6, 6, 5, 1...
## $ column_ah <int> 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 2, 0, 0, 1, ...
## $ column_ai <int> 0, 0, 0, 0, 0, 0, 1, 1, 2, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, ...
## $ column_aj <int> 4, 0, 1, 0, 2, 1, 0, 1, 0, 0, 0, 0, 4, 0, 0, 0, 0, 2, 0, ...
## $ column_ak <chr> "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FA...
## $ column_al <int> 13, 10, 7, 8, 5, 6, 5, 4, 5, 4, 7, 12, 5, 6, 6, 10, 10, 6...
## $ column_am <int> 3, 5, 3, 1, 2, 2, 2, 5, 3, 5, 3, 3, 5, 3, 3, 3, 5, 2, 4, ...
## $ column_an <int> 3, 0, 2, 3, 4, 4, 2, 7, 2, 1, 0, 4, 7, 5, 6, 3, 1, 0, 3, ...
## $ column_ao <int> 3, 0, 2, 3, 4, 4, 2, 7, 2, 1, 0, 4, 7, 5, 6, 3, 1, 0, 3, ...
## $ column_ap <int> 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, ...
## $ column_aq <chr> "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0...
## $ column_ar <int> 27, 33, 24, 15, 24, 27, 24, 24, 27, 27, 27, 27, 24, 26, 2...
## $ column_as <int> 10, 14, 10, 5, 7, 14, 6, 8, 5, 9, 14, 9, 13, 11, 13, 18, ...
## $ column_at <int> 2, 2, 0, 0, 2, 1, 0, 0, 0, 0, 1, 0, 3, 1, 0, 2, 0, 0, 1, ...
## $ column_au <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ column_av <int> 1, 2, 1, 0, 1, 0, 1, 0, 1, 3, 1, 0, 1, 1, 1, 0, 0, 2, 1, ...
## $ column_aw <chr> "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FA...
## $ column_ax <int> 33, 36, 30, 19, 36, 36, 26, 34, 35, 30, 34, 31, 34, 32, 3...
## $ column_ay <int> 7, 5, 7, 5, 12, 9, 4, 10, 10, 6, 8, 4, 11, 8, 10, 6, 4, 4...
## $ column_az <int> 1, 0, 0, 1, 3, 0, 1, 1, 1, 2, 1, 0, 1, 1, 1, 2, 1, 1, 3, ...
## $ column_ba <int> 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ column_bb <int> 1, 0, 2, 1, 0, 2, 1, 3, 1, 0, 0, 4, 4, 4, 3, 1, 1, 0, 0, ...
## $ column_bc <int> 3, 0, 2, 3, 5, 4, 2, 7, 2, 1, 0, 4, 9, 5, 6, 3, 1, 0, 3, ...
## $ column_bd <int> 1, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0, ...
## $ column_be <int> 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ column_bf <int> 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 2, 0, 0, 1, 0, 0, 1, ...
## $ column_bg <int> 3, 6, 1, 1, 1, 2, 2, 7, 5, 7, 0, 3, 4, 0, 0, 4, 1, 3, 5, ...
## $ column_bh <int> 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 0, 0, ...
## $ column_bi <int> 4, 9, 6, 4, 7, 8, 7, 6, 6, 8, 8, 9, 6, 5, 3, 4, 5, 6, 5, ...
## $ column_bj <int> 0, 0, 1, 0, 1, 2, 0, 3, 0, 0, 1, 0, 0, 0, 0, 1, 1, 2, 0, ...
## $ column_bk <int> 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, ...
## $ column_bl <int> 1, 2, 1, 0, 1, 0, 1, 0, 0, 2, 1, 0, 1, 1, 1, 0, 0, 1, 1, ...
## $ column_bm <chr> "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FA...
## $ column_bn <int> 8, 10, 6, 2, 8, 7, 4, 10, 11, 9, 7, 3, 6, 2, 3, 8, 4, 5, ...
## $ column_bo <int> 5, 7, 2, 2, 3, 4, 2, 4, 3, 3, 4, 3, 4, 3, 4, 5, 5, 3, 5, ...
## $ column_bp <int> 5, 5, 0, 2, 4, 6, 1, 1, 3, 4, 7, 4, 4, 4, 3, 5, 5, 3, 9, ...
## $ column_bq <int> 5, 5, 0, 2, 4, 6, 1, 1, 3, 4, 7, 4, 4, 4, 2, 5, 5, 3, 9, ...
## $ column_br <int> 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 3, ...
## $ column_bs <chr> "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0", "0...
## $ column_bt <int> 27, 33, 27, 16, 27, 27, 27, 27, 27, 27, 27, 27, 27, 27, 2...
## $ column_bu <int> 12, 14, 12, 8, 15, 10, 8, 8, 16, 10, 10, 8, 18, 10, 7, 10...
## $ column_bv <int> 0, 0, 0, 2, 0, 4, 1, 0, 1, 0, 0, 2, 0, 0, 1, 0, 0, 0, 1, ...
## $ column_bw <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ...
## $ column_bx <int> 4, 0, 1, 0, 2, 1, 0, 1, 0, 0, 0, 0, 4, 0, 0, 0, 0, 3, 1, ...
## $ column_by <chr> "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FALSE", "FA...
## $ column_bz <chr> "marsr901", "herna901", "hirsj901", "marsr901", "demud901...
## $ column_ca <chr> "Randy Marsh", "Angel Hernandez", "John Hirschbeck", "Ran...
## $ column_cb <chr> "herna901", "fostm901", "willc901", "herna901", "relic901...
## $ column_cc <chr> "Angel Hernandez", "Marty Foster", "Charlie Williams", "A...
## $ column_cd <chr> "fostm901", "kulpr901", "wegnm901", "fostm901", "eddid901...
## $ column_ce <chr> "Marty Foster", "Ron Kulpa", "Mark Wegner", "Marty Foster...
## $ column_cf <chr> "kulpr901", "marsr901", "reynj901", "kulpr901", "carlm901...

```

```

## $ column_cg <chr> "Ron Kulpa", "Randy Marsh", "Jim Reynolds", "Ron Kulpa", ...
## $ column_ch <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "" ...
## $ column_ci <chr> "(none)", "(none)", "(none)", "(none)", "(none)", "(none)...
## $ column_cj <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "" ...
## $ column_ck <chr> "(none)", "(none)", "(none)", "(none)", "(none)", "(none)...
## $ column_cl <chr> "bayld001", "valeb102", "bellb001", "loped001", "baked002...
## $ column_cm <chr> "Don Baylor", "Bobby Valentine", "Buddy Bell", "Davey Lop...
## $ column_cn <chr> "valeb102", "bayld001", "cox-b103", "mckej801", "bolej801...
## $ column_co <chr> "Bobby Valentine", "Don Baylor", "Bobby Cox", "Jack McKeo...
## $ column_cp <chr> "liebj001", "cookd001", "maddg002", "", "ferna001", "brow...
## $ column_cq <chr> "Jon Lieber", "Dennis Cook", "Greg Maddux", "", "Alex Fer...
## $ column_cr <chr> "hampm001", "yound002", "astap001", "", "hernl003", "herm...
## $ column_cs <chr> "Mike Hampton", "Danny Young", "Pedro Astacio", "", "Liva...
## $ column_ct <chr> "aguir001", "", "remlm001", "", "alfoa001", "adamt001", "...
## $ column_cu <chr> "Rick Aguilera", "(none)", "Mike Remlinger", "(none)", "A...
## $ column_cv <chr> "andrs001", "agbab001", "galaa001", "", "", "", "belld001...
## $ column_cw <chr> "Shane Andrews", "Benny Agbayani", "Andres Galarrraga", "(...
## $ column_cx <chr> "liebj001", "reedr002", "astap001", "woods001", "hernl003...
## $ column_cy <chr> "Jon Lieber", "Rick Reed", "Pedro Astacio", "Steve Woodar...
## $ column_cz <chr> "hampm001", "farnk001", "maddg002", "harnp001", "ferna001...
## $ column_da <chr> "Mike Hampton", "Kyle Farnsworth", "Greg Maddux", "Pete H...
## $ column_db <chr> "youn001", "hendr001", "goodt001", "grism001", "benam001...
## $ column_dc <chr> "Eric Young", "Rickey Henderson", "Tom Goodwin", "Marquis...
## $ column_dd <int> 4, 7, 8, 8, 8, 8, 7, 4, 4, 8, 8, 9, 4, 7, 8, 8, 8, 8, ...
## $ column_de <chr> "bufod001", "hamid001", "lansm001", "lorem001", "muelb001...
## $ column_df <chr> "Damon Buford", "Darryl Hamilton", "Mike Lansing", "Mark ...
## $ column_dg <int> 8, 8, 4, 6, 5, 4, 6, 6, 6, 6, 9, 2, 6, 4, 7, 4, 6, 5, 4, ...
## $ column_dh <chr> "gracm001", "alfoe001", "walkl001", "burnj001", "bondb001...
## $ column_di <chr> "Mark Grace", "Edgardo Alfonzo", "Larry Walker", "Jeromy ...
## $ column_dj <int> 3, 4, 9, 9, 7, 7, 9, 9, 9, 4, 10, 7, 3, 8, 5, 5, 9, 7, 7,...
## $ column_dk <chr> "sosas001", "piazm001", "cirij001", "jenkg001", "kentj001...
## $ column_dl <chr> "Sammy Sosa", "Mike Piazza", "Jeff Cirillo", "Geoff Jenki...
## $ column_dm <int> 9, 2, 5, 7, 4, 9, 5, 3, 10, 9, 3, 10, 9, 9, 2, 3, 3, 4, 9...
## $ column_dn <chr> "rodrh001", "ventr001", "heltt001", "hernj001", "snowj001...
## $ column_do <chr> "Henry Rodriguez", "Robin Ventura", "Todd Helton", "Jose ...
## $ column_dp <int> 7, 5, 3, 5, 3, 3, 3, 7, 3, 3, 7, 3, 10, 3, 4, 7, 7, 3, 3,...
## $ column_dq <chr> "andrs001", "belld001", "hammj001", "barkk001", "burke001...
## $ column_dr <chr> "Shane Andrews", "Derek Bell", "Jeffrey Hammonds", "Kevin...
## $ column_ds <int> 5, 9, 7, 3, 9, 2, 4, 5, 8, 10, 5, 5, 8, 5, 3, 6, 5, 9, 5,...
## $ column_dt <chr> "nievj002", "zeilt001", "peren001", "bellr002", "aurir001...
## $ column_du <chr> "Jose Nieves", "Todd Zeile", "Neifi Perez", "Ronnie Belli...
## $ column_dv <int> 6, 3, 6, 4, 6, 5, 8, 8, 2, 7, 2, 4, 7, 10, 9, 9, 4, 6, 2,...
## $ column_dw <chr> "giraj001", "ordor001", "maynb001", "blanh001", "estab001...
## $ column_dx <chr> "Joe Girardi", "Rey Ordonez", "Brent Mayne", "Henry Blanc...
## $ column_dy <int> 2, 6, 2, 2, 2, 6, 2, 2, 7, 5, 6, 8, 5, 2, 6, 2, 2, 2, 6, ...
## $ column_dz <chr> "liebj001", "reedr002", "astap001", "woods001", "hernl003...
## $ column_ea <chr> "Jon Lieber", "Rick Reed", "Pedro Astacio", "Steve Woodar...
## $ column_eb <int> 1, 1, 1, 1, 1, 1, 1, 1, 5, 2, 4, 6, 2, 6, 1, 1, 1, 1, 1, ...
## $ column_ec <chr> "hendr001", "youn001", "veraq001", "reesp001", "castl001...
## $ column_ed <chr> "Rickey Henderson", "Eric Young", "Quilvio Veras", "Pokey...
## $ column_ee <int> 7, 4, 4, 4, 4, 8, 7, 4, 7, 8, 4, 8, 6, 7, 6, 4, 4, 4, 8, ...
## $ column_ef <chr> "hamid001", "bufod001", "sandr002", "larkb001", "gonza002...
## $ column_eg <chr> "Darryl Hamilton", "Damon Buford", "Reggie Sanders", "Bar...
## $ column_eh <int> 8, 8, 7, 6, 6, 4, 9, 6, 4, 4, 6, 6, 7, 4, 4, 9, 6, 6, 4, ...

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## $ column_ei <chr> "alfoe001", "sosas001", "jonec004", "grifk002", "floyc001...
## $ column_ej <chr> "Edgardo Alfonzo", "Sammy Sosa", "Chipper Jones", "Ken Gr...
## $ column_ek <int> 4, 9, 5, 8, 7, 7, 4, 7, 3, 7, 9, 3, 2, 9, 7, 5, 8, 7, 7, ...
## $ column_el <chr> "piazm001", "gracm001", "jordb001", "bichd001", "wilsp002...
## $ column_em <chr> "Mike Piazza", "Mark Grace", "Brian Jordan", "Dante Biche...
## $ column_en <int> 2, 3, 9, 9, 8, 9, 2, 5, 9, 9, 10, 10, 10, 3, 3, 3, 9, 8, ...
## $ column_eo <chr> "ventr001", "rodrh001", "galaa001", "yound001", "lowem001...
## $ column_ep <chr> "Robin Ventura", "Henry Rodriguez", "Andres Galarraga", "...
## $ column_eq <int> 5, 7, 3, 3, 5, 3, 3, 8, 8, 10, 5, 9, 8, 10, 8, 2, 3, 5, 3...
## $ column_er <chr> "belld001", "andrs001", "jonea002", "taube001", "millk005...
## $ column_es <chr> "Derek Bell", "Shane Andrews", "Andruw Jones", "Ed Tauben...
## $ column_et <int> 9, 5, 8, 2, 3, 5, 5, 3, 5, 5, 3, 7, 3, 5, 9, 7, 7, 3, 5, ...
## $ column_eu <chr> "zeilt001", "husoj001", "peree002", "boona001", "browb003...
## $ column_ev <chr> "Todd Zeile", "Jeff Huson", "Eddie Perez", "Aaron Boone",...
## $ column_ew <int> 3, 6, 2, 5, 9, 2, 8, 9, 10, 3, 7, 2, 9, 2, 5, 8, 5, 9, 2,...
## $ column_ex <chr> "ordor001", "giraj001", "weisw001", "tuckm001", "redmm001...
## $ column_ey <chr> "Rey Ordonez", "Joe Girardi", "Walt Weiss", "Michael Tuck...
## $ column_ez <int> 6, 2, 6, 7, 2, 6, 6, 2, 2, 2, 2, 5, 5, 8, 2, 6, 2, 2, 6, ...
## $ column_fa <chr> "hampm001", "farnk001", "maddg002", "harnp001", "ferna001...
## $ column_fb <chr> "Mike Hampton", "Kyle Farnsworth", "Greg Maddux", "Pete H...
## $ column_fc <int> 1, 1, 1, 1, 1, 1, 1, 1, 6, 6, 8, 4, 4, 6, 1, 1, 1, 1, 1, ...
## $ column_fd <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "...
## $ column_fe <chr> "TRUE", "TRUE", "TRUE", "TRUE", "TRUE", "TRUE", "TRUE", "...

```