Hotel Recommendations

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# Import data

# Random 1% sample (241179 rows)  
df\_train\_sample <- read.csv("data/train\_sample.csv", header = TRUE)  
  
# destination file  
df\_dest <- read.csv("data/destinations.csv", header = TRUE)

## Review dataframe - Train

The data consists of the string variables ‘date\_time’, ‘srch\_ci’, and ‘srch\_co’ which will not be usable by some machine learning algorithms so I’ll need to break them apart if I want to use them.

head(df\_train\_sample)

## X date\_time site\_name posa\_continent user\_location\_country  
## 1 32352134 2014-05-22 11:40:07 2 3 66  
## 2 29796021 2013-06-29 12:24:37 2 3 66  
## 3 15185156 2014-10-30 13:58:32 2 3 66  
## 4 3301948 2014-08-22 20:14:34 2 3 66  
## 5 25429119 2014-03-25 18:47:43 2 3 66  
## 6 23257207 2014-07-16 08:33:24 2 3 66  
## user\_location\_region user\_location\_city orig\_destination\_distance user\_id  
## 1 174 24103 2323.5232 802499  
## 2 311 25538 2288.6121 85229  
## 3 294 40046 587.6970 755217  
## 4 332 55121 2234.4394 160733  
## 5 314 47869 839.0087 1078493  
## 6 363 12346 324.7167 380701  
## is\_mobile is\_package channel srch\_ci srch\_co srch\_adults\_cnt  
## 1 0 1 9 2014-07-24 2014-07-24 2  
## 2 0 0 9 2013-07-05 2013-07-09 3  
## 3 0 1 9 2014-12-19 2014-12-22 2  
## 4 0 1 9 2015-01-23 2015-01-30 2  
## 5 0 0 9 2014-04-17 2014-04-20 4  
## 6 0 0 1 2014-08-05 2014-08-11 2  
## srch\_children\_cnt srch\_rm\_cnt srch\_destination\_id srch\_destination\_type\_id  
## 1 0 1 1442 3  
## 2 1 1 8272 1  
## 3 0 1 11321 1  
## 4 0 1 1152 1  
## 5 0 1 8284 1  
## 6 0 1 11547 1  
## is\_booking cnt hotel\_continent hotel\_country hotel\_market hotel\_cluster  
## 1 0 1 4 125 177 44  
## 2 0 1 2 50 659 59  
## 3 0 1 2 50 642 22  
## 4 1 1 4 47 1502 65  
## 5 0 4 2 50 685 6  
## 6 0 1 2 50 554 17

## Review dataframe - Destinations

head(df\_dest)

## srch\_destination\_id d1 d2 d3 d4 d5  
## 1 0 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 1 -2.181690 -2.181690 -2.181690 -2.082564 -2.181690  
## 3 2 -2.183490 -2.224164 -2.224164 -2.189562 -2.105819  
## 4 3 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 4 -2.189562 -2.187783 -2.194008 -2.171153 -2.152303  
## 6 5 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d6 d7 d8 d9 d10 d11 d12  
## 1 -1.897627 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.165028 -2.181690 -2.181690 -2.031597 -2.181690 -2.181690 -2.181690  
## 3 -2.075407 -2.224164 -2.118483 -2.140393 -2.224164 -2.209855 -2.224164  
## 4 -2.115485 -2.177409 -2.177409 -2.177409 -2.177409 -2.161081 -2.177409  
## 5 -2.056618 -2.194008 -2.194008 -2.145911 -2.194008 -2.089094 -2.194008  
## 6 -2.155473 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d13 d14 d15 d16 d17 d18 d19  
## 1 -2.198657 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.110723 -2.186008 -2.224164 -2.124474 -2.224164 -2.156467 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.130158 -2.177409 -2.177409 -2.177409  
## 5 -2.155205 -2.070995 -2.194008 -2.074964 -2.185526 -2.194008 -2.189562  
## 6 -2.174489 -2.174489 -2.174489 -2.155473 -2.174489 -2.174489 -2.174489  
## d20 d21 d22 d23 d24 d25 d26  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.224164 -2.224164 -2.224164 -2.224164 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.191779 -2.185032 -2.150215 -2.194008 -2.189233 -2.194008 -2.191631  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d27 d28 d29 d30 d31 d32 d33  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.224164 -2.153316 -2.186008 -2.224164 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.146025 -2.194008 -2.130263 -2.177813 -2.194008 -2.159651 -2.194008  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d34 d35 d36 d37 d38 d39 d40  
## 1 -2.198657 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.043789 -2.181690 -2.181690 -2.181690  
## 3 -2.128237 -2.158309 -2.059716 -1.910270 -2.224164 -2.123050 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.101291 -2.177409 -2.177409 -2.177409  
## 5 -2.170700 -2.194008 -2.194008 -1.946523 -2.191779 -2.194008 -2.172218  
## 6 -2.174489 -2.174489 -2.174489 -2.155473 -2.174489 -2.174489 -2.174489  
## d41 d42 d43 d44 d45 d46 d47  
## 1 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.165028 -2.181690 -2.133508 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.154047 -2.197327 -1.945461 -2.224164 -2.224164 -2.197327 -2.166886  
## 4 -2.177409 -2.177409 -2.145344 -2.177409 -2.177409 -2.177409 -2.145344  
## 5 -2.188901 -2.194008 -2.109317 -2.181161 -2.175595 -2.194008 -2.180677  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d48 d49 d50 d51 d52 d53 d54  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.133508 -2.181690  
## 3 -2.192009 -1.903782 -2.224164 -2.189562 -2.224164 -2.083104 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.092435 -2.194008 -2.172544 -2.194008 -2.145418 -2.194008  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d55 d56 d57 d58 d59 d60 d61  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.082564 -2.181690 -2.181690 -2.181690  
## 3 -2.070096 -2.157745 -2.196379 -2.069813 -2.224164 -2.224164 -2.072953  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.115699 -2.120789 -2.188037 -2.149211 -2.194008 -2.194008 -2.191779  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d62 d63 d64 d65 d66 d67 d68  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.224164 -2.224164 -2.224164 -2.140393 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.185032 -2.194008 -2.194008 -2.169871 -2.194008 -2.194008  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d69 d70 d71 d72 d73 d74 d75  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.096550 -2.224164 -2.187529 -2.224164 -2.224164 -2.098667 -2.016373  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.167989 -2.194008 -2.158422 -2.194008 -2.191779 -2.174543 -2.180712  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d76 d77 d78 d79 d80 d81 d82  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.126123 -2.189562 -2.008317 -2.085827 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.177944 -2.188901 -2.165486 -2.191779 -2.145961 -2.194008 -2.187356  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d83 d84 d85 d86 d87 d88 d89  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.165028 -2.165028 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.218361 -2.219342 -2.224164 -2.224164 -2.160492 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.169871 -2.191715 -2.191110 -2.194008 -2.194008 -2.176134 -2.194008  
## 6 -2.174489 -2.155473 -2.155473 -2.174489 -2.174489 -2.174489 -2.174489  
## d90 d91 d92 d93 d94 d95 d96  
## 1 -2.198657 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.082564 -2.181690 -2.133508 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.076796 -2.224164 -1.975081 -2.166149 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.101291 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.194008 -2.194008 -1.964288 -2.176791 -2.191779 -2.191779  
## 6 -2.174489 -2.174489 -2.174489 -2.155473 -2.174489 -2.174489 -2.174489  
## d97 d98 d99 d100 d101 d102 d103  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.082564 -2.181690 -2.181690 -2.181690 -2.181690 -2.165028  
## 3 -2.224164 -2.224164 -2.224164 -2.163748 -2.224164 -2.072359 -2.100277  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.189562 -2.194008 -2.194008 -2.194008 -2.165889 -2.194008 -2.145988  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d104 d105 d106 d107 d108 d109 d110  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.148982 -2.181690 -2.181690  
## 3 -2.224164 -2.203533 -2.224164 -2.224164 -2.094364 -2.224164 -2.140393  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.161081 -2.177409 -2.177409  
## 5 -2.194008 -2.194008 -2.191779 -2.194008 -2.097420 -2.194008 -2.180027  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.155473 -2.174489 -2.174489  
## d111 d112 d113 d114 d115 d116 d117  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.164722 -2.224164 -2.154997 -2.197327 -2.224164 -2.197327  
## 4 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.194008 -2.194008 -2.194008 -2.191779 -2.194008 -2.194008  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d118 d119 d120 d121 d122 d123 d124  
## 1 -2.198657 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690 -2.133508 -2.181690 -2.181690  
## 3 -2.224164 -2.224164 -2.197327 -2.187005 -2.026263 -2.224164 -2.224164  
## 4 -2.177409 -2.177409 -2.177409 -2.115485 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.194008 -2.194008 -2.152740 -2.139178 -2.194008 -2.182305  
## 6 -2.174489 -2.174489 -2.174489 -2.155473 -2.155473 -2.174489 -2.174489  
## d125 d126 d127 d128 d129 d130 d131  
## 1 -2.198657 -2.198657 -2.198657 -1.897627 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.133508 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.223818 -2.224164 -2.049280 -2.189562 -2.118483 -2.145558  
## 4 -2.177409 -2.177409 -2.177409 -2.161081 -2.177409 -2.177409 -2.161081  
## 5 -2.194008 -2.194008 -2.194008 -2.157163 -2.194008 -2.174454 -2.139365  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d132 d133 d134 d135 d136 d137 d138  
## 1 -1.897627 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.148982 -2.181690 -2.181690 -2.181690 -2.181690 -2.148982 -2.181690  
## 3 -2.117811 -2.224164 -2.180182 -2.224164 -2.224164 -2.214572 -2.186008  
## 4 -2.130158 -2.177409 -2.177409 -2.177409 -2.177409 -2.115485 -2.177409  
## 5 -2.099302 -2.194008 -2.194008 -2.194008 -2.194008 -2.151470 -2.194008  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.155473 -2.174489  
## d139 d140 d141 d142 d143 d144 d145  
## 1 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.165028 -2.181690 -2.165028 -2.181690 -2.181690 -2.165028  
## 3 -2.191569 -2.224164 -2.224164 -2.196379 -2.224164 -2.192009 -2.224164  
## 4 -2.161081 -2.161081 -2.177409 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.163242 -2.187356 -2.194008 -2.191779 -2.194008 -2.194008 -2.185161  
## 6 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489 -2.174489  
## d146 d147 d148 d149  
## 1 -2.198657 -2.198657 -2.198657 -2.198657  
## 2 -2.181690 -2.181690 -2.181690 -2.181690  
## 3 -2.224164 -2.224164 -2.224164 -2.057548  
## 4 -2.177409 -2.177409 -2.177409 -2.177409  
## 5 -2.194008 -2.194008 -2.194008 -2.188037  
## 6 -2.174489 -2.174489 -2.174489 -2.174489

## Review structure - Train

str(df\_train\_sample)

## 'data.frame': 241179 obs. of 25 variables:  
## $ X : int 32352134 29796021 15185156 3301948 25429119 23257207 7223820 8978014 35823442 7791597 ...  
## $ date\_time : Factor w/ 240445 levels "2013-01-07 00:08:30",..: 118546 34623 204954 167036 95596 144881 153396 118972 6482 68341 ...  
## $ site\_name : int 2 2 2 2 2 2 2 2 2 34 ...  
## $ posa\_continent : int 3 3 3 3 3 3 3 3 3 3 ...  
## $ user\_location\_country : int 66 66 66 66 66 66 66 66 66 205 ...  
## $ user\_location\_region : int 174 311 294 332 314 363 184 442 314 135 ...  
## $ user\_location\_city : int 24103 25538 40046 55121 47869 12346 26602 12416 18442 27655 ...  
## $ orig\_destination\_distance: num 2324 2289 588 2234 839 ...  
## $ user\_id : int 802499 85229 755217 160733 1078493 380701 786061 77941 397526 1194667 ...  
## $ is\_mobile : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ is\_package : int 1 0 1 1 0 0 0 0 0 0 ...  
## $ channel : int 9 9 9 9 9 1 3 9 0 5 ...  
## $ srch\_ci : Factor w/ 1085 levels "2013-01-07","2013-01-08",..: 564 180 712 747 466 576 576 503 44 360 ...  
## $ srch\_co : Factor w/ 1094 levels "2013-01-08","2013-01-09",..: 563 183 714 753 468 581 576 504 46 360 ...  
## $ srch\_adults\_cnt : int 2 3 2 2 4 2 5 2 2 4 ...  
## $ srch\_children\_cnt : int 0 1 0 0 0 0 1 0 0 1 ...  
## $ srch\_rm\_cnt : int 1 1 1 1 1 1 1 1 1 2 ...  
## $ srch\_destination\_id : int 1442 8272 11321 1152 8284 11547 1901 8243 49086 26466 ...  
## $ srch\_destination\_type\_id : int 3 1 1 1 1 1 1 1 6 6 ...  
## $ is\_booking : int 0 0 0 1 0 0 0 0 0 1 ...  
## $ cnt : int 1 1 1 1 4 1 4 1 1 1 ...  
## $ hotel\_continent : int 4 2 2 4 2 2 2 2 2 2 ...  
## $ hotel\_country : int 125 50 50 47 50 50 198 50 50 198 ...  
## $ hotel\_market : int 177 659 642 1502 685 554 401 409 685 1625 ...  
## $ hotel\_cluster : int 44 59 22 65 6 17 73 25 25 63 ...

## Review structure - Destinations

str(df\_dest)

## 'data.frame': 62106 obs. of 150 variables:  
## $ srch\_destination\_id: int 0 1 2 3 4 5 6 7 8 9 ...  
## $ d1 : num -2.2 -2.18 -2.18 -2.18 -2.19 ...  
## $ d2 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d3 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d4 : num -2.2 -2.08 -2.19 -2.18 -2.17 ...  
## $ d5 : num -2.2 -2.18 -2.11 -2.18 -2.15 ...  
## $ d6 : num -1.9 -2.17 -2.08 -2.12 -2.06 ...  
## $ d7 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d8 : num -2.2 -2.18 -2.12 -2.18 -2.19 ...  
## $ d9 : num -1.9 -2.03 -2.14 -2.18 -2.15 ...  
## $ d10 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d11 : num -2.2 -2.18 -2.21 -2.16 -2.09 ...  
## $ d12 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d13 : num -2.2 -2.18 -2.11 -2.18 -2.16 ...  
## $ d14 : num -2.2 -2.18 -2.19 -2.18 -2.07 ...  
## $ d15 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d16 : num -1.9 -2.18 -2.12 -2.13 -2.07 ...  
## $ d17 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d18 : num -2.2 -2.18 -2.16 -2.18 -2.19 ...  
## $ d19 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d20 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d21 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d22 : num -2.2 -2.18 -2.22 -2.18 -2.15 ...  
## $ d23 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d24 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d25 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d26 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d27 : num -2.2 -2.18 -2.22 -2.18 -2.15 ...  
## $ d28 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d29 : num -2.2 -2.18 -2.15 -2.18 -2.13 ...  
## $ d30 : num -2.2 -2.18 -2.19 -2.18 -2.18 ...  
## $ d31 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d32 : num -2.2 -2.18 -2.22 -2.18 -2.16 ...  
## $ d33 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d34 : num -2.2 -2.18 -2.13 -2.18 -2.17 ...  
## $ d35 : num -2.2 -2.18 -2.16 -2.18 -2.19 ...  
## $ d36 : num -2.2 -2.18 -2.06 -2.18 -2.19 ...  
## $ d37 : num -1.9 -2.04 -1.91 -2.1 -1.95 ...  
## $ d38 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d39 : num -2.2 -2.18 -2.12 -2.18 -2.19 ...  
## $ d40 : num -2.2 -2.18 -2.22 -2.18 -2.17 ...  
## $ d41 : num -2.2 -2.17 -2.15 -2.18 -2.19 ...  
## $ d42 : num -2.2 -2.18 -2.2 -2.18 -2.19 ...  
## $ d43 : num -1.9 -2.13 -1.95 -2.15 -2.11 ...  
## $ d44 : num -2.2 -2.18 -2.22 -2.18 -2.18 ...  
## $ d45 : num -2.2 -2.18 -2.22 -2.18 -2.18 ...  
## $ d46 : num -2.2 -2.18 -2.2 -2.18 -2.19 ...  
## $ d47 : num -2.2 -2.18 -2.17 -2.15 -2.18 ...  
## $ d48 : num -2.2 -2.18 -2.19 -2.18 -2.19 ...  
## $ d49 : num -2.2 -2.18 -1.9 -2.18 -2.09 ...  
## $ d50 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d51 : num -2.2 -2.18 -2.19 -2.18 -2.17 ...  
## $ d52 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d53 : num -2.2 -2.13 -2.08 -2.18 -2.15 ...  
## $ d54 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d55 : num -2.2 -2.18 -2.07 -2.18 -2.12 ...  
## $ d56 : num -2.2 -2.18 -2.16 -2.18 -2.12 ...  
## $ d57 : num -2.2 -2.18 -2.2 -2.18 -2.19 ...  
## $ d58 : num -2.2 -2.08 -2.07 -2.18 -2.15 ...  
## $ d59 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d60 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d61 : num -2.2 -2.18 -2.07 -2.18 -2.19 ...  
## $ d62 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d63 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d64 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d65 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d66 : num -2.2 -2.18 -2.14 -2.18 -2.17 ...  
## $ d67 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d68 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d69 : num -2.2 -2.18 -2.1 -2.18 -2.17 ...  
## $ d70 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d71 : num -2.2 -2.18 -2.19 -2.18 -2.16 ...  
## $ d72 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d73 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d74 : num -2.2 -2.18 -2.1 -2.18 -2.17 ...  
## $ d75 : num -2.2 -2.18 -2.02 -2.18 -2.18 ...  
## $ d76 : num -2.2 -2.18 -2.22 -2.18 -2.18 ...  
## $ d77 : num -2.2 -2.18 -2.13 -2.18 -2.19 ...  
## $ d78 : num -2.2 -2.18 -2.19 -2.18 -2.17 ...  
## $ d79 : num -2.2 -2.18 -2.01 -2.18 -2.19 ...  
## $ d80 : num -2.2 -2.18 -2.09 -2.18 -2.15 ...  
## $ d81 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d82 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d83 : num -2.2 -2.18 -2.22 -2.18 -2.17 ...  
## $ d84 : num -2.2 -2.17 -2.22 -2.18 -2.19 ...  
## $ d85 : num -2.2 -2.17 -2.22 -2.18 -2.19 ...  
## $ d86 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d87 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d88 : num -2.2 -2.18 -2.16 -2.18 -2.18 ...  
## $ d89 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d90 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d91 : num -2.2 -2.08 -2.08 -2.18 -2.19 ...  
## $ d92 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d93 : num -1.9 -2.13 -1.98 -2.1 -1.96 ...  
## $ d94 : num -2.2 -2.18 -2.17 -2.18 -2.18 ...  
## $ d95 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d96 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d97 : num -2.2 -2.18 -2.22 -2.18 -2.19 ...  
## $ d98 : num -2.2 -2.08 -2.22 -2.18 -2.19 ...  
## [list output truncated]

## Histogram of ‘hotel\_cluster’

hist(df\_train\_sample$hotel\_cluster,  
 main = "Distribution of 'hotel\_cluster'",  
 xlab = "Hotel Cluster",  
 col = "lightblue"  
 )

