Preprocessing data with *recipes* : : **CHEAT SHEET**

Basics

Get your data ready for modeling using 'pipable' sequences of feature engineering steps with **recipes**

```
#----- Initialize the recipe and add steps ----
rec <- recipe(x ~ ., data = train_data) |>
  step_normalize(all_numeric_predictors())

#----- Run the steps using training data ------
pr <- prep(rec, training = train_data)

#--------- Apply estimates to new data --------
bake(pr, new_data = new_data)
```

recipe(x, …**)** - Begins a new recipe specification.
prep(x, …**)** - Prepares the recipe with training data.
bake(object, …**)** - Applies estimates from `prep()`.
update(object, …**)** - Updates and re-fits a model.

COMMON `*STEP*_` ARGUMENTS

`recipe`	A recipe object. New steps are appended to the recipe.
`...`	Arguments passed to the external R function accessed by the step function
`options`	Selector functions to choose variables for this step

Filters

step_*(recipe, ...)

step_nzv(freq_cut = 95/5, unique_cut = 10, options = list(freq_cut = 95/5**)** - Removes variables that are highly sparse and unbalanced.

step_zv(group = NULL**)** - Removes variables that contain only a single value.

step_lincomb(max_steps = 5**)** - Removes numeric variables that have exact linear combinations between them.

step_corr(threshold = 0.9, use = "pairwise.complete.obs", method = "pearson"**)** - Removes variables that have large absolute correlations with other variables.

step_filter_missing(threshold = 0.1**)** - Removes variables that have too many missing values.

step_rm() - Removes selected variables.

In-place Transformations

step_mutate(recipe, ..., .pkgs = character()**)** - General purpose transformer using `dplyr`.

step_relu(recipe, ..., shift = 0, reverse = FALSE, smooth = FALSE, prefix = "right_relu_"**)** - Applies smoothed rectified linear transformation.

step_sqrt(recipe, ...**)** - Applies square root transformation.

BASIS FUNCTIONS

step_*(recipe, ..., keep_original_cols = FALSE)

step_spline_natural(deg_free = 10, options = NULL**)** - Creates a natural spline (a.k.a restricted cubic spline) features.

step_spline_b(deg_free = 10, degree = 3, options = NULL**)** - Creates b-spline features.

step_spline_convex(deg_free = 10, degree = 3, options = NULL**)**

step_spline_monotone(deg_free = 10, degree = 3, options = NULL**)**

step_spline_nonnegative(deg_free = 10, degree = 3, options = NULL**)**

step_poly(degree = 2L, options = list()**)** - Creates new columns that are basis expansions of variables using orthogonal polynomials.

step_poly_bernstein(degree = 10, options = NULL, results = NULL**)** - Creates Bernstein polynomial features.

NORMALIZATION

step_*(recipe, ...)

step_normalize(na_rm = TRUE**)** - Normalizes to have a standard deviation of 1 and mean of 0.

step_YeoJohnson() - Makes data look more like a normal distribution.

step_percentile(options = list(probs = (0:100)/100), outside = "none"**)** - Replaces the value of a variable with its percentile from the training set.

step_range(min = 0, max = 1, clipping = TRUE**)** - Normalizes numeric data to be within a pre-defined range of values.

step_spatialsign(na_rm = TRUE**)** - Converts numeric data into a projection on to a unit sphere.

DISCRETIZE

step_*(recipe, ...)

step_discretize(num_breaks = 4, min_unique = 10, options = list(prefix = "bin")**)** - Converts numeric data into a factor with bins having approximately the same number of data points.

step_cut(breaks, include_outside_range = FALSE**)** - Cuts a numeric variable into a factor based on provided boundary values.

Imputation

step_*(recipe, ...)

step_impute_bag(impute_with = all_predictors(), trees = 25, options = list(keepX = FALSE)**)** - Creates a bagged tree model for data. Good for categorical data.

step_impute_knn(neighbors = 5, impute_with = all_predictors(), options = list(nthread = 1, eps = 1e-08)**)** - Uses Gower's distance which can be used for mixtures of nominal and numeric data.

step_impute_linear(impute_with = all_predictors()**)** - Creates linear regression models to impute missing data.

step_impute_lower(threshold = NULL**)** - Substitutes the truncated value by a random number between zero and the truncation point.

step_impute_mean(trim = 0**)** - Substitutes missing values of numeric variables by the training set mean of those variables.

step_impute_median() - Substitutes missing values of numeric variables by the training set median of those variables.

step_impute_mode() - Imputes nominal data using the most common value.

step_impute_roll(statistic = median, window = 5L**)** - Imputes numeric data using a rolling window statistic.

step_unknown(new_level = "unknown"**)** - Assigns a missing value in a factor level to "unknown".

Encodings

step_*(recipe, ...)

TYPE CONVERTERS

step_factor2string() - Converts one or more factor vectors to strings.

step_string2factor() - Converts one or more character vectors to factors (ordered or unordered).

step_num2factor(transform = function(x) x**)** - Converts one or more numeric vectors to factors (ordered or unordered). This can be useful when categories are encoded as integers.

step_integer(strict = TRUE, zero_based = FALSE**)** - Converts data into a set of ascending integers based on the ascending order from the training data.

VALUE CONVERTERS

step_indicate_na(sparse = "auto", keep_original_cols = TRUE**)** - Creates and append additional binary columns to the data set to indicate which observations are missing.

step_ordinalscore(convert = as.numeric**)** - Converts ordinal factor variables into numeric scores.

step_unorder() - Turns ordered factor variables into unordered factor variables.

OTHER

step_relevel(ref_level**)** - Reorders factor columns so that the level specified by ref_level is first. This is useful for `contr.treatment()` contrasts which take the first level as the reference.

step_novel(new_level = "new"**)** - Assigns a previously unseen factor level to "new" .

step_other(threshold = 0.05, other = "other" **)** - Pools infrequently occurring values into an "other" category.

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Dummy Variables

step_dummy*(recipe, ..., sparse = "auto", keep_original_cols = FALSE)

step_dummy(threshold = 0, other = "other", naming = dummy_names, prefix = NULL**)** - Standard dummy variable converter.

step_dummy_extract(sep = NULL, pattern = NULL, threshold = 0, other = "other"**)** - Converts multiple nominal data into one or more numeric integer terms for the levels of the original data.

step_dummy_multi_choice(threshold = 0, other = "other"**)** - Converts multiple nominal data into one or more numeric binary terms for the levels of the original data.

CONVERT

step_bin2factor(recipe, ..., levels = c("yes", "no"), ref_first = TRUE**)** - Converts dummy variable into 2-level factor.

TEXT

step_*(recipe, ..., pattern = ".", options = list(), result = make.names(pattern), sparse = "auto", keep_original_cols = TRUE)

step_regex(options = list()**)** - Creates a dummy variable that detects the given regular expression.

step_count(normalize = FALSE**)** - Create counts of patterns using regular expressions.

Date & Time

step_*(recipe, ..., keep_original_cols = TRUE)

step_date(features = c("dow", "month", "year"), abbr = TRUE, label = TRUE, ordinal = FALSE, locale = clock::clock_locale()$labels**)** - Converts date data into one or more factor or numeric variables (dow = day of week).

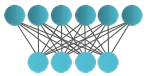
step_time(features = c("hour", "minute", "second"**))** - Converts date-time data into one or more factor or numeric variables.

step_holiday(holidays = c("LaborDay", "NewYearsDay", "ChristmasDay"), sparse = "auto"**)** - Converts date data into binary indicators variables for common holidays.

Multivariate Transformations

SIGNAL EXTRACTION

step_*(recipe, ..., keep_original_cols = FALSE)



step_pca(num_comp = 5, threshold = NA, options = list()**)** - Converts numeric variables into one or more principal components.

step_ica(num_comp = 5, options = list(method = "C")**)** - Converts numeric data into one or more independent components.

step_kpca_poly(num_comp = 5, degree = 2, scale_factor = 1, offset = 1**)** - Converts numeric data into principal components using a polynomial kernel basis expansion.

step_kpca_rbf(num_comp = 5, sigma = 0.2**)** - Converts numeric data into principal components using a radial basis function kernel basis expansion.

step_isomap(num_terms = 5, neighbors = 50, options = list(.mute = c("message", "output"))**)** - Uses multidimensional scaling to convert numeric data into new dimensions.

step_nnmf_sparse(num_comp = 2, penalty = 0.001, options = list()**)** - Converts numeric data into non-negative components.

step_pls(num_comp = 2, predictor_prop = 1, outcome = NULL, options = list(scale = TRUE), preserve = deprecated(), prefix = "PLS") - Converts numeric data into one or more new dimensions.

CENTROIDS

step_*(recipe, ..., keep_original_cols = FALSE)

step_classdist(class, mean_func = mean, cov_func = cov, pool = FALSE, log = TRUE, prefix = "classdist_"**)** - Converts numeric data into Mahalanobis distance measurements to the data centroid.

step_classdist_shrunken(class = NULL, threshold = 1/2, sd_offset = 1/2, log = TRUE, prefix = "classdist_") - Converts numeric data into Euclidean distance to the regularized class centroid.

step_depth(class, metric = "halfspace", options = list(), data = NULL, prefix = "depth_"**)** - Converts numeric data into a measurement of data depth by category

OTHER

step_geodist(recipe, lat = NULL, lon = NULL, ref_lat = NULL, ref_lon = NULL, is_lat_lon = TRUE, log = FALSE, name = "geo_dist", keep_original_cols = TRUE**)** - Calculates the distance between points on a map to a reference location.

step_ratio(recipe, …, denom = denom_vars(), naming = function(numer, denom) {make.names(paste(numer, denom, sep = "_o_"))}, keep_original_cols = TRUE**)** - Creates ratios from selected numeric variables (denom).

Row operations

step_*(recipe, ...)

step_naomit() - Removes observations if they contain NA or NaN values.

step_sample(size = NULL, replace = FALSE**)** - Samples rows using `dplyr::sample_n()` or `dplyr::sample_frac()`.

step_shuffle() - Randomly changes the order of rows for selected variables.

step_slice() - Filters rows using `dplyr::slice()`.

Other

step_interact(recipe, terms, sep = "_x_", keep_original_cols = TRUE**)** - Creates new columns that are interaction terms between two or more variables.

step_rename(recipe, ...**)** - Adds variables using `dplyr::rename()`.

step_window(recipe, …, size = 3, na_rm = TRUE, statistic = "mean", keep_original_cols = TRUE**)** - Creates new columns that are the results of functions that compute statistics across moving windows.

Role & type

SELECTORS

all_outcomes() / all_predictors() - Select variables from formula based on the most common two roles.

has_role(match = "predictor"**)** - Select by passing the role name required.

has_type(match = "numeric"**)**- Select by type of variable.

CONVENIENCE SELECTORS

all_string_predictors()	1.1	3L	A	✓	●	1
all_logical_predictors()	1.1	3L	A	✓	●	1
all_numeric_predictors()	1.1	3L	A	✓	●	1
all_integer_predictors()	1.1	3L	A	✓	●	1
all_double_predictors()	1.1	3L	A	✓	●	1
all_factor_predictors()	1.1	3L	A	✓	●	1
all_ordered_predictors()	1.1	3L	A	✓	●	1
all_unordered_predictors()	1.1	3L	A	✓	●	1
all_nominal_predictors()	1.1	3L	A	✓	●	1

all_date_predictors() / all_datetime_predictors()

ROLE MANAGEMENT

In case a variable is not a outcome or predictor but needs to be retained. Create new role, and set it to not 'bake'.

```
rec <- recipe(x ~ ., data = train_data) |>
  update_role(my_id, new_role = "id") |>
  update_role_requirements(rec,"id",bake = FALSE)
```

add_role(recipe, …, new_role = "predictor", new_type = NULL**)** - Adds an additional role to variables that already have a role in the recipe.

update_role(recipe, …, new_role = "predictor", old_role = NULL**)** - Alters an existing role in the recipe or assigns an initial role to variables that do not yet have a declared role.

remove_role(recipe, …, old_role**)** - Eliminates a single existing role in the recipe.

update_role_requirements(recipe, …, bake = NULL**)** - Allows for fine tunes requirements of the various roles you might come across in recipes.