Johnathan Evanilla Configuración del entorno	
# Establecer la variable de entorno para python Sys.setenv("RETICULATE_PYTHON"="C:/Users/EQUIPO/. # Cargar los bibliotecas	i-navigator/conda/envs/OHW")
library(keras) library(dplyr) library(keras3) Registered S3 methods overwritten by 'keras': method from	
as.data.frame.keras_training_history keras3 plot.keras_training_history keras3 print.keras_training_history keras3 r_to_py.R6ClassGenerator keras3	
Attaching package: 'dplyr' The following objects are masked from 'package:sta	s':
<pre>filter, lag The following objects are masked from 'package:bas intersect, setdiff, setequal, union</pre>	
Attaching package: 'keras3'	
The following objects are masked from 'package:ker %<-active%, %py_class%, activation_elu, activation_gelu, activation_hard_sigmoid, activation_relu, activation_selu, activation_s	ion_exponential, vation_linear,
activation_softmax, activation_softplus, activation_tanh, adapt, application_densenet12 application_densenet169, application_densenet2 application_efficientnet_b0, application_efficientnet_b2, application_efficientnet_b2, application_efficientnet_b4, application_efficientnetnetnetnetnetnetnetnetnetnetnetnetn	tion_softsign, , , 1, entnet_b1, entnet_b3,
application_efficientnet_b6, application_effic application_inception_resnet_v2, application_i application_mobilenet, application_mobilenet_v application_mobilenet_v3_large, application_mo application_nasnetlarge, application_nasnetmob	entnet_b7, ception_v3, cilenet_v3_small, le,
application_resnet101, application_resnet101_v application_resnet152_v application_resnet50_v2, application_resnet50_v2, application_vgg19, application_xception, bidir callback_backup_and_restore, callback_csv_logg callback_early_stopping, callback_lambda,	application_vgg16, ectional, er,
<pre>callback_learning_rate_scheduler, callback_mod callback_reduce_lr_on_plateau, callback_remote callback_tensorboard, clone_model, constraint_ constraint_minmaxnorm, constraint_nonneg, cons count_params, custom_metric, dataset_boston_ho dataset_cifar10, dataset_cifar100, dataset_fas</pre>	monitor, maxnorm, raint_unitnorm, sing,
<pre>dataset_imdb, dataset_imdb_word_index, dataset dataset_reuters, dataset_reuters_word_index, f from_config, get_config, get_file, get_layer, get_weights, image_array_save, image_dataset_f image_load, image_to_array, imagenet_decode_pr imagenet_preprocess_input, initializer_constan</pre>	reeze_weights, ret_vocabulary, rom_directory, rdictions,
<pre>initializer_glorot_normal, initializer_glorot_ initializer_he_normal, initializer_he_uniform, initializer_identity, initializer_lecun_normal initializer_lecun_uniform, initializer_ones, initializer_orthogonal, initializer_random_nor initializer_random_uniform, initializer_trunca</pre>	miform,
initializer_variance_scaling, initializer_zero keras, keras_model, keras_model_sequential, La layer_activation, layer_activation_elu, layer_activation_leaky_relu, layer_activation_layer_activation_relu, layer_activation_softma layer_activity_regularization, layer_add, layer_activity_regularization, layer_add, layer_activity_regularization, layer_add, layer_activity_regularization, layer_add, layer_activity_regularization, layer_add, layer_activity_regularization, layer_add, layer_activity_regularization, layer_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_regularization_activity_reg	, install_keras, er, varametric_relu,
<pre>layer_alpha_dropout, layer_attention, layer_av layer_average_pooling_1d, layer_average_poolin layer_average_pooling_3d, layer_batch_normaliz layer_category_encoding, layer_center_crop, la layer_conv_1d, layer_conv_1d_transpose, layer_</pre>	erage, 1_2d, tion, er_concatenate, toonv_2d,
<pre>layer_conv_2d_transpose, layer_conv_3d, layer_ layer_conv_lstm_1d, layer_conv_lstm_2d, layer_ layer_cropping_1d, layer_cropping_2d, layer_cr layer_dense, layer_depthwise_conv_1d, layer_de layer_discretization, layer_dot, layer_dropout layer_flatten, layer_gaussian_dropout, layer_g</pre>	conv_lstm_3d, pping_3d, thwise_conv_2d, layer_embedding, ussian_noise,
<pre>layer_global_average_pooling_1d, layer_global_ layer_global_average_pooling_3d, layer_global_ layer_global_max_pooling_2d, layer_global_max_ layer_gru, layer_hashing, layer_input, layer_i layer_lambda, layer_layer_normalization, layer layer_max_pooling_1d, layer_max_pooling_2d, la</pre>	max_pooling_1d, pooling_3d, teger_lookup, lstm, layer_masking,
layer_maximum, layer_minimum, layer_multi_head layer_multiply, layer_normalization, layer_per layer_random_brightness, layer_random_contrast layer_random_flip, layer_random_rotation, layer layer_random_zoom, layer_repeat_vector, layer_layer_reshape, layer_resizing, layer_rnn, layer	attention, nute, layer_random_crop, c_random_translation, rescaling,
layer_resnape, layer_resizing, layer_rnn, layer layer_separable_conv_2d, layer_simple_rnn, layer_spatial_dropout_1d, layer_spatial_dropout layer_spatial_dropout_3d, layer_string_lookup, layer_text_vectorization, layer_unit_normaliza layer_upsampling_1d, layer_upsampling_2d, layer layer_zero_padding_1d, layer_zero_padding_2d,	_2d, layer_subtract, ion,
<pre>layer_zero_padding_3d, learning_rate_schedule_ learning_rate_schedule_cosine_decay_restarts, learning_rate_schedule_exponential_decay, learning_rate_schedule_inverse_time_decay, learning_rate_schedule_piecewise_constant_decay</pre>	
learning_rate_schedule_polynomial_decay, loss_ loss_categorical_crossentropy, loss_categorica loss_cosine_similarity, loss_hinge, loss_huber loss_mean_absolute_error, loss_mean_absolute_p loss_mean_squared_error, loss_mean_squared_log loss_poisson, loss_sparse_categorical_crossent	_hinge, loss_kl_divergence, ercentage_error, erthmic_error,
loss_squared_hinge, mark_active, metric_auc, metric_binary_accuracy, metric_binary_crossent metric_categorical_accuracy, metric_categorica metric_categorical_hinge, metric_cosine_simila metric_false_negatives, metric_false_positives metric_mean, metric_mean_absolute_error,	copy,crossentropy, ity, metric_hinge,
<pre>metric_mean_absolute_percentage_error, metric_ metric_mean_squared_error, metric_mean_squared metric_mean_wrapper, metric_poisson, metric_pr metric_precision_at_recall, metric_recall, metric_recall_at_precision, metric_root_mean_s metric_sensitivity_at_specificity,</pre>	logarithmic_error, ecision,
<pre>metric_sparse_categorical_accuracy, metric_sparse_categorical_crossentropy, metric_sparse_top_k_categorical_accuracy, metric_specificity_at_sensitivity, metric_squa metric_sum, metric_top_k_categorical_accuracy, metric_true_negatives, metric_true_positives,</pre>	
new_layer_class, new_learning_rate_schedule_cl new_metric_class, new_model_class, normalize, optimizer_adagrad, optimizer_adam, optimizer_a optimizer_ftrl, optimizer_nadam, optimizer_rms pad_sequences, pop_layer, predict_on_batch, re	ngtimizer_adadelta, lamax, larop, optimizer_sgd, mularizer_11,
regularizer_11_12, regularizer_12, regularizer set_vocabulary, set_weights, shape, test_on_ba text_dataset_from_directory, time_distributed, timeseries_dataset_from_array, to_categorical, unfreeze_weights, use_backend, with_custom_obj	train_on_batch,
<pre># Cargar la funciones auxiliares source("tutorial_functions.R")</pre>	
<pre># Leer archivo csv raw_data <- readr::read_csv("tutorial_data_test.c" #head(raw_data)</pre>	·v")
Rows: 6273 Columns: 22 Column specification Delimiter: "," chr (2): id, location_id dbl (19): gap_days, year, classification, total_t	xicity, t1, t2, t3, t4, t
<pre>date (1): date i Use `spec()` to retrieve the full column specifi i Specify the column types or set `show_col_types</pre>	eation for this data.
<pre># Transformación logaritmica raw_data <- raw_data %>% log_inputs(vars = c("t1", "t2", "t3", "t4", " Generación de imágenes</pre>	5", "t6", "t7", "t8", "t9", "t10", "t11", "t12"))
<pre>#Generate images from data image_list <- make_image_list(raw_data,</pre>	,10,30,80),
<pre>n_steps = 2, minimum_gap = 4, maximum_gap = 10 toxins = c(environmentals = c(</pre>	't1", "t2", "t3", "t4", "t5", "t6", "t7", "t8", "t9", "t10", "t11", "t12"),
<pre>#Splits image_list by year for grouping into trai years <- sapply(image_list, function(x) {return(x #str(years) #image_list <- split(image_list,as.factor(years))</pre>	
<pre>image_list <- split(image_list, years) #str(image_list) #configuration YEARS_TRAINING <- c("2014", "2016", "2017") YEARS_TESTING <- "2015"</pre>	
<pre>#Make a training set train <- pool_images_and_labels(image_list[YEARS_ #Make a test set</pre>	RAINING], num_classes = 4)
<pre>test <- pool_images_and_labels(image_list[YEARS_T #load(file = "data.Rdata") #dim(raw_data)</pre>	STING], num_classes = 4)
<pre>#length(years) model <- keras::keras_model_sequential() %>% keras::layer_dense(units=64,</pre>	
<pre>input_shape = dim(train\$imag</pre>)[2],
<pre>name = "hidden_1") %>% keras::layer_dropout(rate=0.3,</pre>	
<pre>name = "hidden_2") %>% keras::layer_dropout(rate=0.2,</pre>	
summary(model) Model: "sequential_1" <u+250f><u+2501><u+2501><u+2501><u+2501><u< td=""><td>.2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></td></u<></u+2501></u+2501></u+2501></u+2501></u+250f>	.2501> <u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501>
<u+2521><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u< td=""><td>Output Shape <u+2503> Param # <u+2503> 2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u< td=""></u<></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2503></u+2503></td></u<></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2521>	Output Shape <u+2503> Param # <u+2503> 2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u+2501><u< td=""></u<></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2501></u+2503></u+2503>
dropout_1 (Dropout)	0
+	528
output (Dense)	68 +
<pre>str(train) head(train\$labels) List of 7 \$ labels : num [1:3413, 1:4] 1 1 0 1 1 1 \$ image : num [1:3413, 1:26] 0 0 0 0.379</pre>	0
\$ classifications: num [1:3413] 0 0 2 0 0 0 0 0 0 0 \$ toxicity : num [1:3413] 0 0 45.21 4.18 2. \$ locations : chr [1:3413] "PSP12.01" "PSP24 \$ dates : num [1:3413] 16964 16238 17307 \$ scaling_factors: NULL A matrix: 6 ×	3 5 13" "PSP10.11" "PSP15.25"
A matrix: 6 × 4 of type dbl 1 0 0 0 1 0 0 0	
0 0 1 0 1 0 0 0 1 0 0 0	
<pre>1 0 0 0 model %>% keras::compile(optimizer = "adam",</pre>	_crossentropy",
<pre>history <- model %>% keras::fit(x = train\$image,</pre>	_accuracy")
<pre>epochs = 32, verbose=1, validation_split = 0.2, shuffle = TRUE)</pre>	
plot (history)	
categorical accura	
0.4- • trainin • validat	
08-	
0.8- 0 5 10 15 20 25 30 metrics <- model %>%	
<pre>keras::evaluate(x = test\$image,</pre>	_argmax() %>% as.array()
<pre>predicted_probs <- model %>% predict(test\$image) metrics ccategorical_accuracy</pre>	0.897273302078247
predictions	0.897273302078247 0.411398500204086 0·1·0·0·0·1·0·0·2·0·0·0·0·0·0·0·0·0·0·0·
0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 ·	0.11.0.1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
<pre>actual_classification = predicted_classification dplyr::mutate(prob_0 = predicted_probs[,1]*</pre>	c(test\$dates), origin = as.Date("1970-01-01")), cest\$classifications, = predictions) %>% .00,
<pre>prob_1 = predicted_probs[,2]* prob_2 = predicted_probs[,3]* prob_3 = predicted_probs[,4]* head(results)</pre>	.00, .00, .00)
A tibble: 6	ation prob_0 prob_1 prob_2 prob_3 1d]> <dbl> <dbl> <dbl> <dbl></dbl></dbl></dbl></dbl>
PSP26.11 2015-08-11 0 PSP10.25 2015-06-01 0 PSP15.13 2015-09-03 0	0 94.531071 5.216153 0.18810517 0.064673979 0 91.465598 7.823986 0.50884802 0.201569055 0 98.496348 1.487587 0.01301790 0.003048059
DCD40 000 0045 05 55	3 5.239873 17.535442 36.16708815 41.057595611
PSP12.002 2015-05-26 1 PSP25.02 2015-07-14 0 PSP27.46 2015-08-10 2	0 96.321362 3.564764 0.08700478 0.026877588 1 24.615008 52.814686 16.17257595 6.397730112

confusion_matrix <- ggplot2::ggplot(data = cm,</pre>

ggplot2::labs(x = "Predicted Classifications",

ggplot2::theme_linedraw() +

confusion_matrix

y = "Actual Classifications",

caption=paste(Sys.Date())) +

legend.position = "none")

title=paste("Confusion Matrix -", YEARS_TESTING, "Toxin Testing Season Hindcast", sep=" "), subtitle=paste("Accuracy:", round(metrics[1] \$categorical_accuracy, 3), "Loss:", round(metrics[2] \$loss, 3), sep=" "),

title = ggplot2::element_text(size = 14, face = "bold"),