Page Blocks Classification

Alexandre SMADJA – Brahim TALB – Ewen RONDEL

Dataset

This dataset is made of blocks information of the page layout of different documents.
Those blocks are labeled with 5 classes:

text **horizontal_line** **graphic** **vertical_line** **picture**

	height	length	area	eccen	p_black	p_and	mean_tr	blackpix	blackand	wb_trans	class
0	5	7	35	1.400	0.400	0.657	2.33	14	23	6	1
1	6	7	42	1.167	0.429	0.881	3.60	18	37	5	1
…	…	…	…	…	…	…	…	…	…	…	…
5472	7	41	287	5.857	0.213	0.801	1.36	61	230	45	1
5473	8	1	8	0.125	1.000	1.000	8.00	8	8	1	4

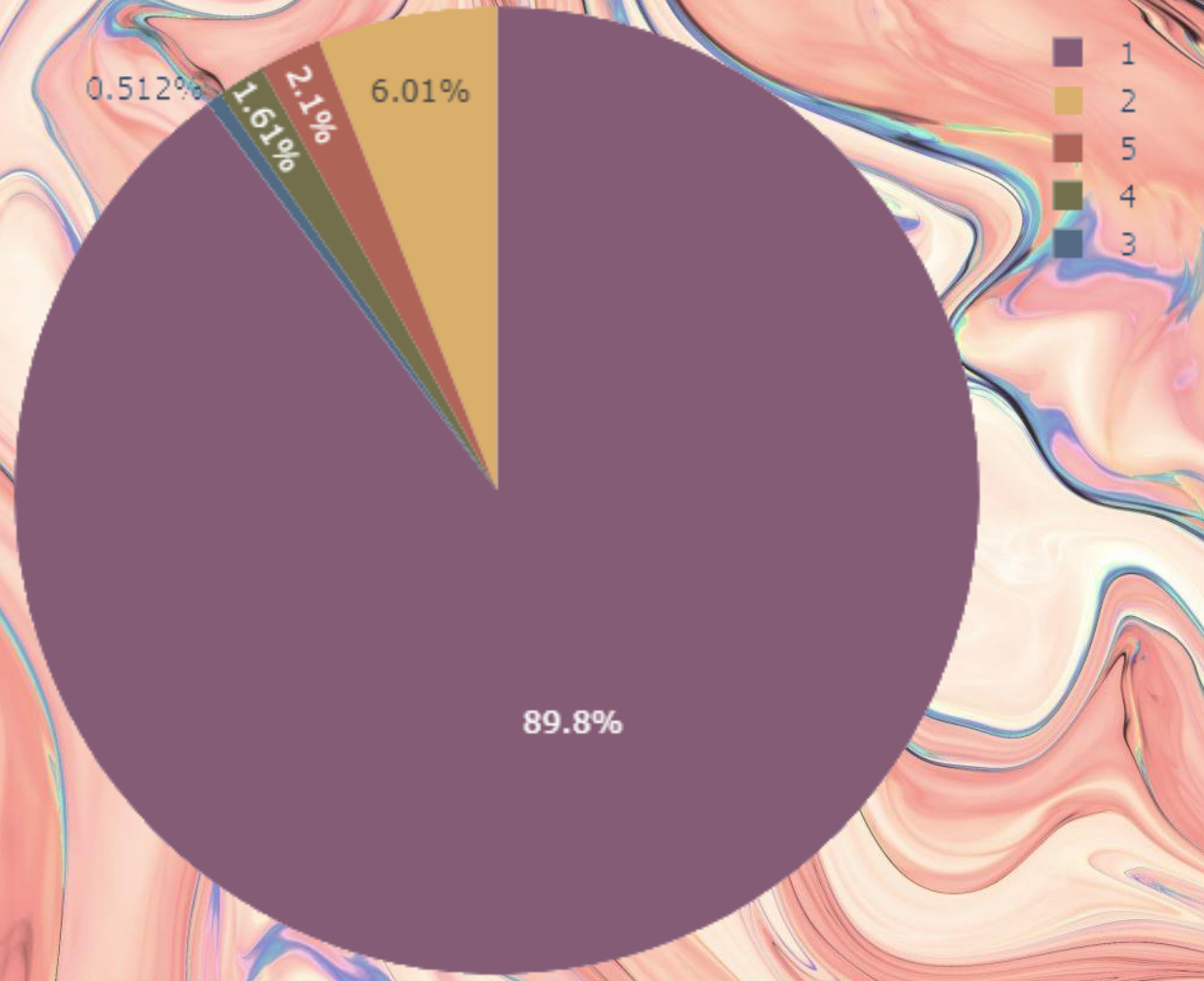
Class	Frequency	Percentage	Cumulative percentage
text	4913	89.8%	89.8%
horizontal_line	329	6.0%	95.8%
graphic	28	0.5%	96.3%
vertical_line	88	1.6%	97.9%
picture	115	2.1%	100%
Total	5473	100%	100%

How to classify all the blocks of the page layout of a document that has been detected by a segmentation process ?

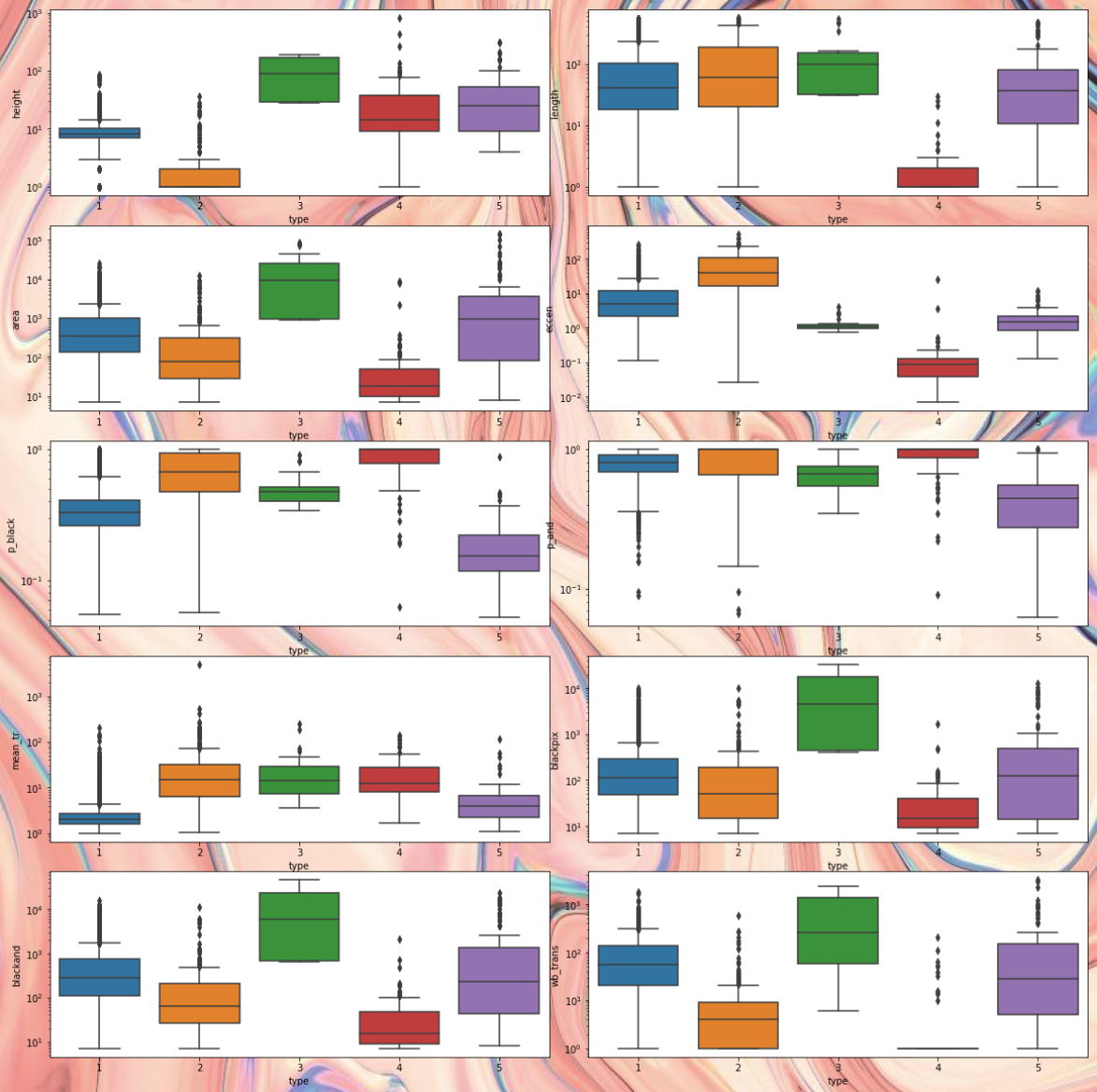
Donato Malerba

Data Visualization

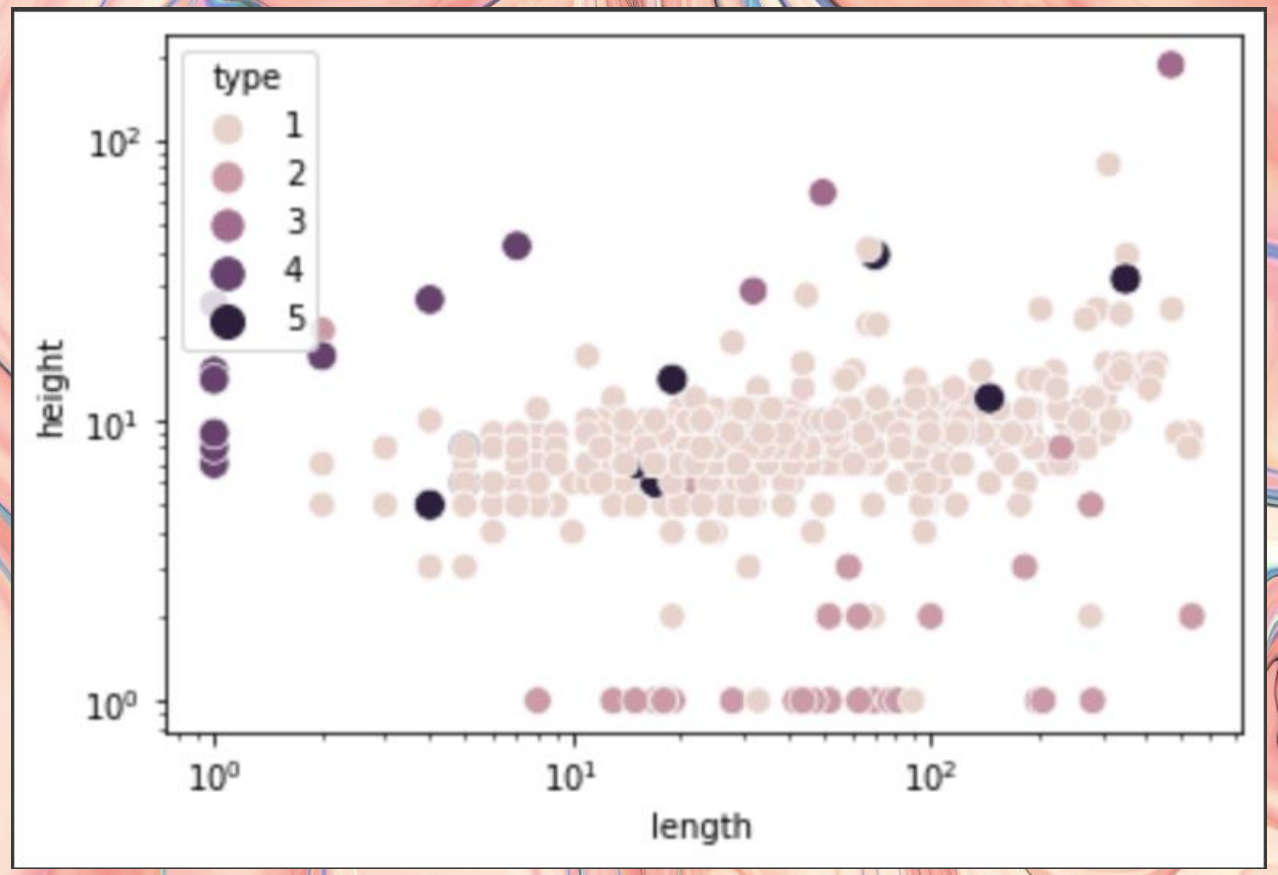
Piechart of all 5 different classes



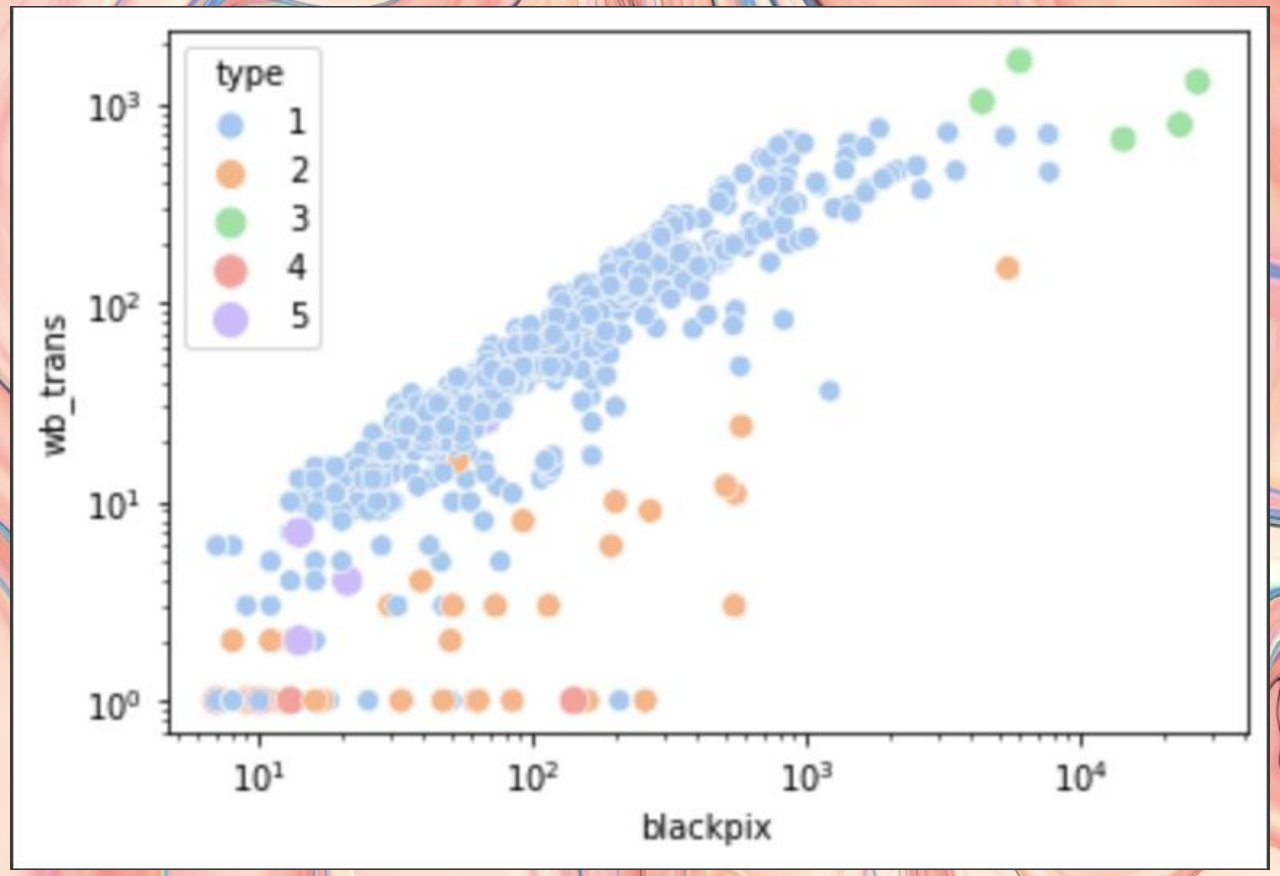
Boxplots of all variables by class using a logaritmic scale



Scatterplot of the height according to the length by class



Scatterplot of the number of black pixels according to the number of white/black transitions



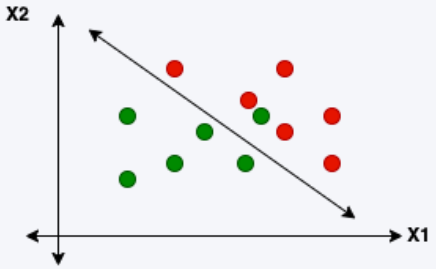
Machine Learning

Linear Regression

Logistic Regression

Linear Regression		Logistic Regression
0.218s	Training time	0.955s
30.9%	Testing score	94.8%

Linear Discriminant Analysis

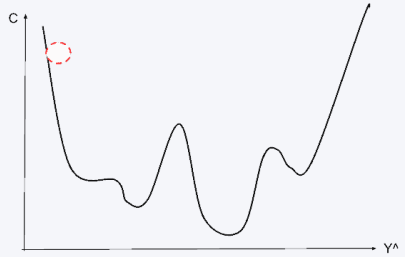


0.527s

94.3%

95.3%

Linear Classifiers with SGD

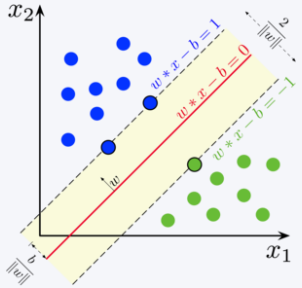


14.37s

93.6%

93.5%

Linear Support Vector Classification



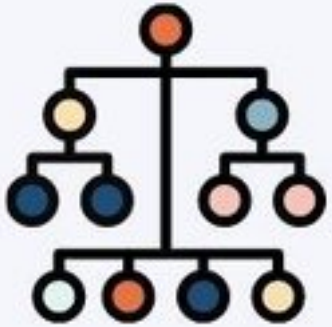
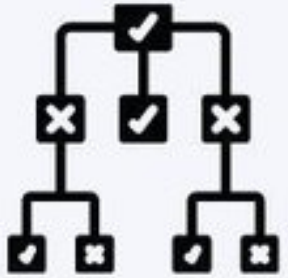
8.12s

95.6%

95.9%

Gaussian Naive Bayes

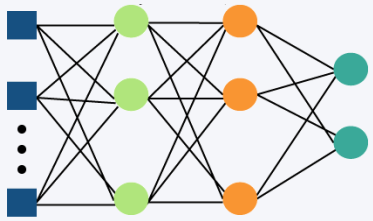
Training time	22.45s
Training score	95.8%
Testing score	96.2%

Decision Tree Classifier		Random Forest Classifier
		
1.562s	Training time	264.8s
95.3%	Training score	96.5%
96.0%	Testing score	97.0%

K-Nearest Neighbors

Training time	22.45s
Training score	95.8%
Testing score	96.2%

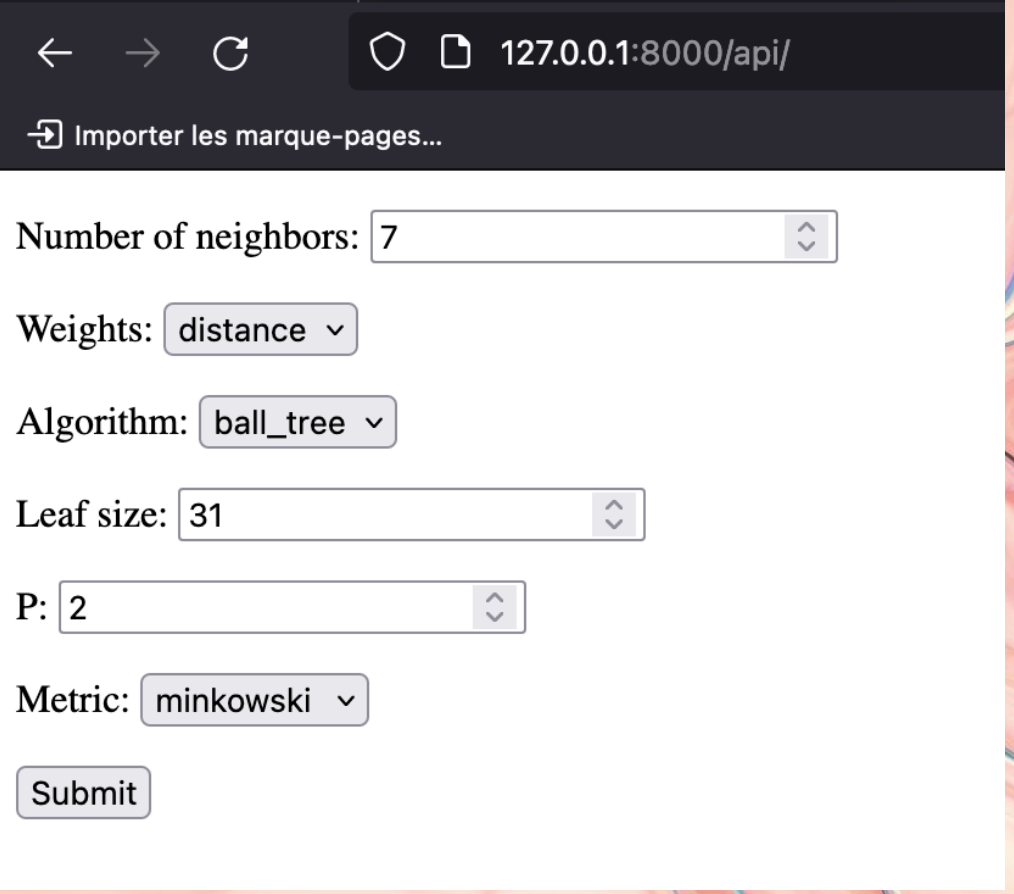
Multi-Layer Perceptron Classifier

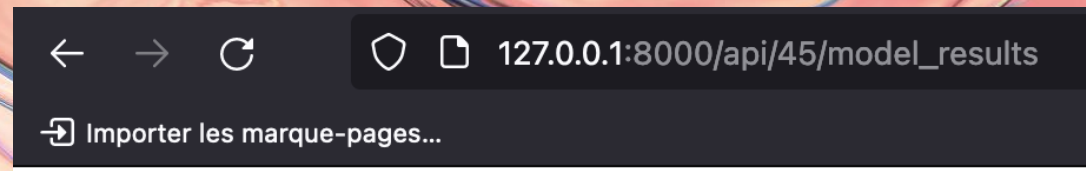


Training time	666.8s
Training score	96.5%
Testing score	96.9%

Model	Training time	Training score	Test score
Linear Regression	0.218s	/	30.9%
Logistic Regression	0.955s	/	94.8%
Linear Discriminant Analysis	0.527s	94.3%	95.3%
Linear Classifiers with SGD	14.37s	93.6%	93.5%
Linear Support Vector Classification	8.12s	95.6%	95.9%
Gaussian Naive Bayes Classifier	0.22s	/	91.0%
Decision Tree Classifier	1.562s	95.3%	96.0%
Random Forest Classifier	264.758s	96.5%	97.0%
K-Nearest Neighbors	22.45s	95.8%	96.2%
Multi-Layer Perceptron Classifier	666.818s	96.5%	96.9%

API





Home

Number of neighbors 7

Weights	distance
Algorithm	ball_tree
Leaf size	31
p	2
Metric	minkowski
Train score	1.00
Test score	0.97

Confusion matrix of the test set:

	1	2	3	4	5
1	983	5	1	0	3
2	6	56	0	0	0
3	3	0	2	0	0
4	7	1	0	11	1
5	9	0	0	0	7