Music Manuscript Author Recognizer

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Project Description

As reference to the last version, Avital and I were making a lot of enhancements about the application capabilities.

3 main enhancements created: more algorithms, Single writer vs. Page writer and cross-correlation view between the algorithms altogether.

1) We added 4 more classification algorithms to achieve smarter and variety application such as:

1. **KNN** – It is a non-parametric method used for classification. The input consists of the k closest training examples in the feature space. An object is classified by a majority vote of its neighbors, with the object being assigned to the class most common among its k nearest neighbors**.**
   k-NN is a type of instance-based learning (our notes), or lazy learning, where the function is only approximated locally, and all computation is deferred until classification.
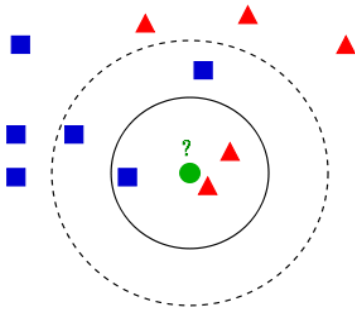
2. **Multinomial-Logistic-Regression** – It is a model that is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables**.**
   The multinomial logistic model assumes that data are case specific. That is, each independent variable has a single value for each case – our writers.
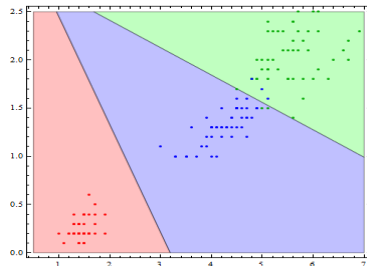

   - Using some machine learning articles, we discovered the weakness of KNN algorithm and the so much powerful of SVM and Logistic Regression on big scale training sets**.**

   That all points led us to develop new integrated algorithms:

3. **Combo 1** – SVM at first to filter objects than operate KNN on the remain notes

4. Combo 2 – Logistic Regression at first to filter objects that operate KNN on the remain notes

2) Using these algorithms, we can classify notes to their real writers with up to 85% of success – depend on the data set size.

System Refactoring And Data View:

Num.	Id.	Image	Page Id.	Real Writer	Predicted Writer	Prob.	Mistake?
1	814		mus_068_1_008_resized.jpg	1	1	0.7880	○
2	418		mus_068_1_036_resized.jpg	2	2	0.1955	○
3	464		mus_068_1_036_resized.jpg	2	2	0.1264	○
4	660		mus_068_1_007_resized.jpg	1	1	0.8729	○
5	901		mus_068_1_008_resized.jpg	17	17	0.0118	○
6	338		mus_068_1_006_resized.jpg	1	1	0.8529	○
7	186		mus_068_1_018_resized.jpg	1	1	0.8208	○
8	7		mus_068_1_005_resized.jpg	1	1	0.8089	○
9	197		mus_068_1_018_resized.jpg	1	1	0.8139	○
10	689		mus_068_1_007_resized.jpg	1	1	0.8303	○

Also, our application could classify each whole page to discover how many writers used it and who.

That is usage to big scale analysis projects and to see the big picture.

System Refactoring And Data View:

Num.	Page Id.	Real Writers Amount	Predicted Writers Amount	Prob.	Who Predicted	Who Real	Mistake?
1	mus_068_1_071_resized.jpg	3	1	0.3333	[11]	[1, 3, 11]	○
2	mus_068_1_006_resized.jpg	3	2	0.6666	[14, 13]	[1, 14, 13]	○
3	mus_068_1_036_resized.jpg	2	0	0.0	[]	[2, 16]	○
4	mus_068_1_005_resized.jpg	3	2	0.6666	[11, 12]	[1, 12, 11]	○
5	mus_068_1_007_resized.jpg	2	1	0.5	[11]	[1, 11]	○

Send

3) In addition, we thought that to a researcher there is no any knowledge of what the best algorithm he needs to use to achieve the best scores.

That point led us to develop cross-correlation tool which can compare the algorithms altogether as relative to the optimal.

Now, each researcher may use the classifier with more self-confidence, basic recognition and understanding with the methods we are using from high-level view.
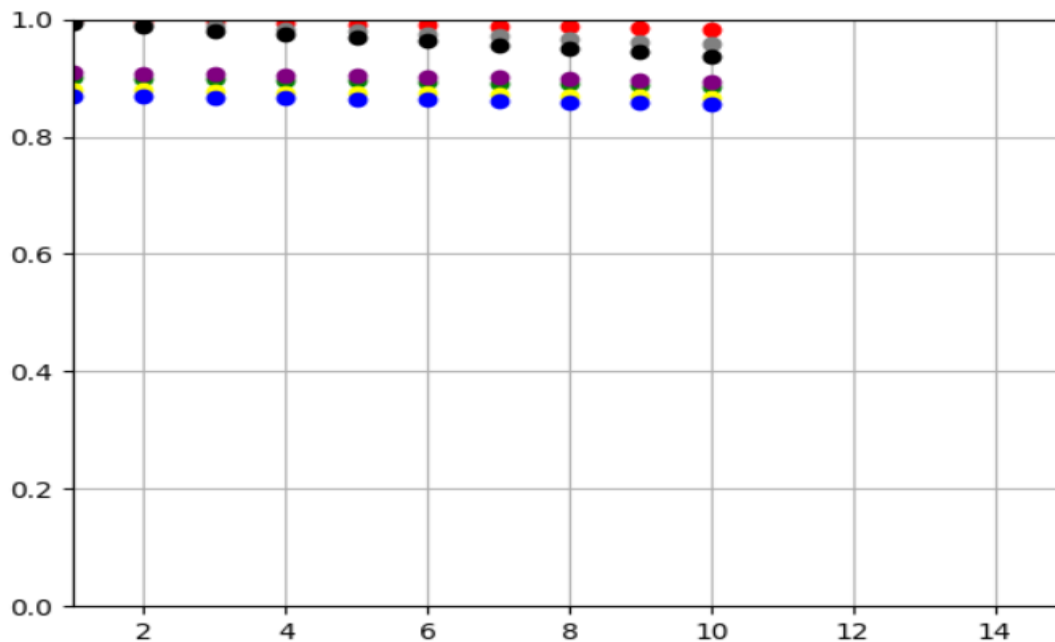
As we can see above, Combo 1 and Combo 2 is getting the best scores than the other, we could be predicting that issue due to of the integrated algorithms that it operates.

Moreover, we added to the HTML page a send function that can use as an infrastructure to Active Learning techniques [read more about the concept].

Application Plug-ins View

The software design is still the same except of new script – "RMtmpsAll.pyw" – that is used to clear all notes from the end-point folder if we need to and contains functions for future enhancement such as – "TruncatedSVD" and so on.
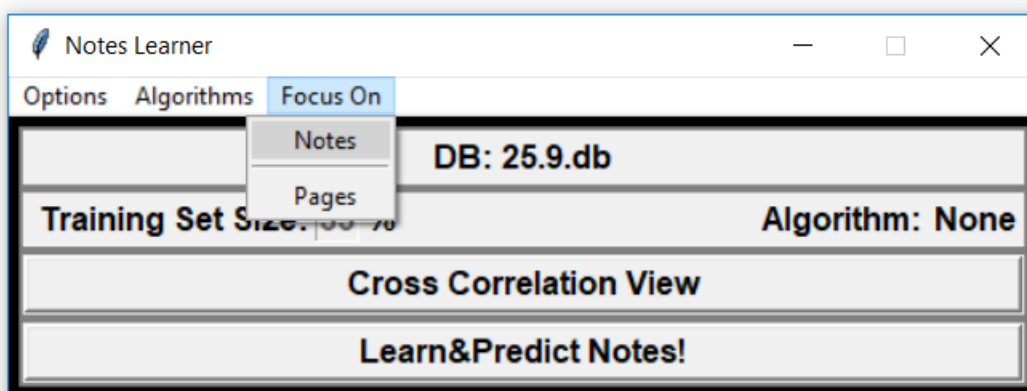
Choosing an algorithm:

- There is no any default algorithm
- Once the algorithm is picked you see the name in the "Algorithm" field
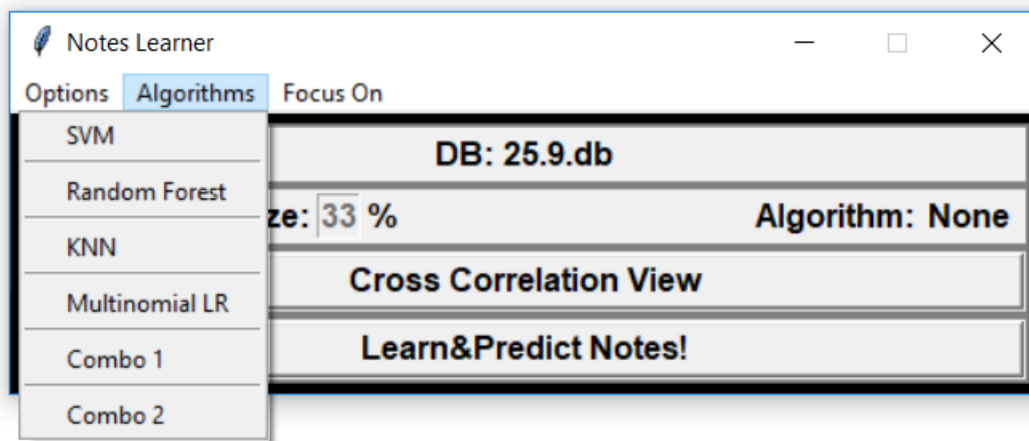
Choosing Single writer vs. Page writers view:

- Default view is Single writer view
- Once the view is picked you see the name on the right side of "Learn&Predict" button label

Notes

- For more deep information and understanding – go to the source code, there is good documentation to start with
- Machine learning knowledge you can learn using "Coursera" online courses, google, python scikit-learn library, tensor-flow framework, University courses and so on

More basic information you could find at our version 1 description

- o **Improvements You Can Do**
    - ▪ SQLite end-point dynamic changing – at this point it is hard coded

Contact me about any question

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