What are you drawing? Classifying Goodle Quick Draw Doodles

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Abstract

Image recognition, especially from scratchy and noisy data, plays a significant role in machine learning. In our project we want to classify the hand-drawn doodles, with 345 categories in total, from Google Quick Draw. We construct different algorithms such as kNN, Logistic Regression, Support Vector Machine, and Convolutional Neural Network, and they each obtains an accuracy of . We also experimented different dimensionality reduction methods for kNN and Logistic Regression. By comparing model performance, we can gain an insight on which classifier is the most suitable for classifying doodles with a lot of categories.

1. Introduction

Quick, Draw![1] is an online game released by Google on November, 2016 where the user is prompted with a specific requirement to draw a picture in 20 seconds and the algorithm will make a prediction based on the drawing. Millions of images were collected by Google through this game, and they were utilized to make better and quicker predictions. Figure 1 showed an example of such images[2]. Such large-scale data set leaves many to the imagination of machine learning enthusiasts and encourages the rises of creative projects. For example, Quartz has explored the drawing habits like stroke order grouped by different countries and found clear associations between the drawing and their language styles [1]; others tried several different prediction models evaluated by prediction accuracy [2].

More than simply classifying doodles, such algorithms could have educational applications for language-learning toddlers as well. They can draw what they see, and learn how to spell or say it, which could accelerate the language learning process. Moreover, since doodles are somewhat sketchy, by constructing algorithms that can make accurate predictions based on sketchy images, the uses of the algorithms could be extended to convert handwritten text to computer, eliminating the need to type all the words.

[1]https://quickdraw.withgoogle.com/

[2]https://github.com/googlecreativelab/quickdraw-dataset

In our project, rather than building seperate algorithms for each category or subset of categories, we combined all categories together as our data set. Therefore, since our data set has 345 categories in total, the prediction accuracy is not very high, but is still higher than what we expected.

Figure 1. Example of quick draw imgaes

Figure 2. Example drawings of teapot

2. Related Work

Related work should be discussed here. This is an example of a citation. To format the citations properly, put the corresponding references into the bibliography.bib file. You can obtain BibTeX-formatted references for the ”bib” file from Google Scholar (`https://scholar.google.com`), for example, by clicking on the double-quote character under a citation and then selecting ”BibTeX” as shown in Figure 3 and Figure 4.

Table 2 shows an example for formatting a table.

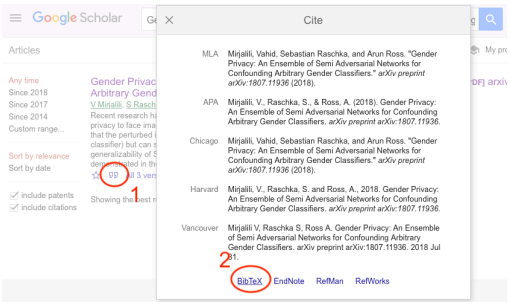

Figure 3. Example illustrating how to get BibTeX references from Google Scholar as a 1-column figure.

Method	Accuracy
Method 1	70 ± 3 %
Method 2	76 ± 3 %

Table 1. This is an example of a table.

3. Proposed Method

Describe the method(s) you are proposing, developing, or using. I.e., details of the algorithms may be included here.

4. Experiments

Describe the experiments you performed. You may want to create separate subsections to further structure this section.

4.1. Dataset

Briefly describe your dataset in a separate subsection.

4.2. Software

Briefly list (and cite) software software you used.

4.3. Hardware

If relevant, list hardware resources you used.

5. Results and Discussion

Describe the results you obtained from the experiments and interpret them. Optionally, you could split "Results and Discussion" into two separate sections.

6. Conclusions

Describe your conclusions here. If there are any future directions, you can describe them here, or you can create a new section for future directions.

7. Acknowledgements

List acknowledgements if any. For example, if someone provided you a dataset, or you used someone else's resources, this is a good place to acknowledge the help or support you received.

8. Contributions

Describe the contributions of each team member who worked on this project.

References

[1] Ha, Thu-Huong, and Sonnad, Nikhil. How do you draw a circle? We analyzed 100,000 drawings to show how culture shapes our instincts, 2017. [Online; accessed 20-October-2019].

[2] Irie, Keisuke. quick,draw! prediction model, 2017. [Online; accessed 20-October-2019].

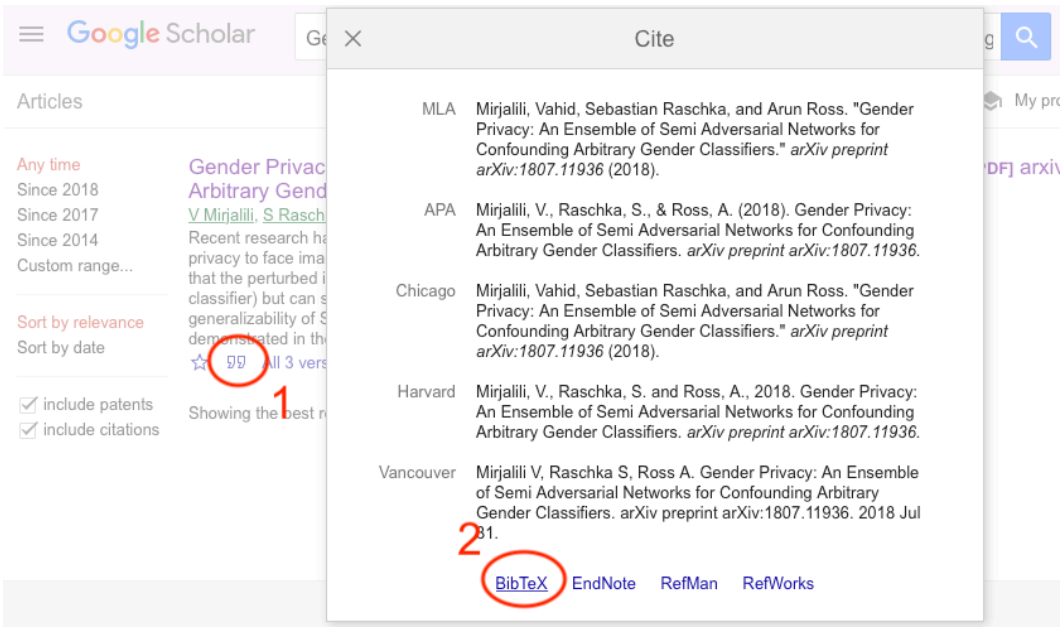

Figure 4. Example illustrating how to get BibTeX references from Google Scholar as a 2-column figure.