THE LARGE LABELLED LOGO DATASET (L3D): A MULTIPURPOSE AND HAND-LABELLED CONTINUOUSLY GROWING DATASET

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ABSTRACT

In this work, we present the Large Labelled Logo Dataset (L3D), a multipurpose, hand-labelled, continuously growing dataset. It is composed of around 770k of color 256x256 RGB images extracted from the European Union Intellectual Property Office (EUIPO) open registry. Each of them is associated to multiple labels that classify the figurative and textual elements that appear in the images. These annotations have been classified by the EUIPO evaluators using the Vienna classification, a hierarchical classification of figurative marks. We suggest two direct applications of this dataset, namely, logo classification and logo generation.

1 Introduction

Having large labelled datasets is of the utmost importance for building deep learning applications. The importance of annotated datasets for the advancement of machine learning is unquestionable. Annotated datasets are needed to understand the complexity of human perception and knowledge acquisition. Thanks to the efforts of many researchers, Deep Learning has large and varied datasets. Datasets such as MNIST or CIFAR are at the basis of definitive advances in automated image recognition. It is important that these datasets represent real cases, their contents are sufficiently refined and the amount of data is representative in variety and quantity of data.

The data set collected corresponds to 0.7M images obtained from the EUIPO trademark register. When a company or individual registers in the EUIPO a logo associated with a company, product or service, the registration is made by standardizing the image used and associating multiple labels describing the figurative elements contained in the image. The objective of the EUIPO evaluators is to verify that no new registration of a logo already exists in the image database nor any of its elements.

To do so, the human staff use multiple tags for each image following the Vienna Classification: [https://www.wipo.int/classifications/vienna/en/](https://www.wipo.int/classifications/vienna/en/) The Vienna Classification of Classification (VCL), whose latest version 9, which is mandatory as of January 1, 2023, can be viewed here: [https://www.wipo.int/classifications/nivilo/vienna.htm](https://www.wipo.int/classifications/nivilo/vienna.htm) is composed of 29 categories organized in a structure of 3 hierarchical levels.

2 Related Work

There is a wide variety of large image datasets suitable for Deep Learning. The well-known MNIST (LeCun and Cortes 2010), CIFAR (Krizhevsky 2009) and Imagenet (Deng et al. 2009) are on the hall of fame and are used as de facto sources for validating new Deep Learning architectures. These datasets started to be used for image classification tasks. However, as Deep Learning architectures unlocked additional capabilities, these datasets have been used for other tasks. At the time this was happening new datasets appeared.

Human perception is based on the understanding of objects and scenes. Multitude of applications, from the development of autonomous cars [Chang et al. 2019], Cordts et al. 2016, Schaler et al. 2018, Yu et al. 2020], digitizing text using
optical character recognition (OCR) systems, improving video game graphics (Richter et al., 2021), transforming
drawings to images (Park et al., 2019) to transferring drawing style (Li et al., 2018).

The most recent datasets and, in turn, most closely linked to human perception are those of DALL-E (Ramesh et al.,
2021) and those being developed by EleutherAI. Both datasets, from the network images and their descriptions, train a
text-to-image model.

The dataset presented in this article consists of digital figurative images created by humans, projecting shapes and
objects, according to the human perception of them. In many cases it is an artistic or synthetic view of the figurative
elements that compose it. In addition, this dataset is rigorously labeled with multiple tags that have a very detailed
granularity organized in a hierarchical fashion. Since images may contain text, it also includes the text that is present in
the image.

A very interesting work on how application of supervised learning algorithms in order to automate the manual
process of labeling trademark images with Vienna codes can be found in Uzairi (2021). This work compares different deep
learning algorithms, namely, CNN, recurrent neural networks (LSTMs and GRUs), Support Vector Machines, Decision
Trees, Random Forests and Naive Bayes models.

3 L3D Dataset

3.1 General dataset description

The European Union Intellectual Property Office (EUIPO), founded in 1994, is the European Union Agency responsible
for the registration of the European Union trade mark and the registered Community design, two unitary intellectual
property rights valid across the 27 Member States of the EU. The EUIPO stores all the information from trademarks
filled at the European Union and distributes them in order to avoid the creation of similar trademarks.

The EUIPO creates monthly incremental versions of the current year and once the year has passed, creates a final
version of that year. In our work we selected images until 2020 for simplicity. However, we encourage researchers
parameterizing the download to obtain next years.

EUIPO’s Open Data Platform is a tool to make all the trademark and design information available and transparent to its
users, with quick and efficient access. A new application makes the Register available to the general public for bulk
download.  

EUIPO started in 1998 making its trade mark database available online to firms and national Industrial Property offices
under a license contract. Now EUIPO is opening their databases to all users, free of charge, updated daily and without
requiring a license.

In order to browse the contents of the database in a user-friendly way, the EUIPO has a trademark viewer web-client.

3.2 Vienna classification

Images Contained in this database are classified using the Vienna Classification (International Classification of the
Figurative Elements of Marks). Vienna Classification (VCL) is an international classification system used to classify
the figurative elements of logos or images registered by companies (company, product or services registered trademarks).

The Vienna Classification of figurative elements was agreed by the World Intellectual Property Organization (WIPO)
in the so-called Vienna Agreement on June 12, 1973, and came into force on August 9, 1985. The use of the Vienna
Classification by national industrial property offices is intended to facilitate the registration of trademarks containing
figurative elements by coding them according to a single classification system at the international level. This facilitates
the search for similar images of other registered trademarks and avoids having to reclassify images when they are
registered in multiple industrial property offices at the international level.

The International Bureau of WIPO also applies the Vienna Classification in the framework of the Madrid System for
the international registration of marks. Around 60 offices in the world apply the Vienna Classification. In addition,
three regional organizations, namely the African Regional Intellectual Property Organization (ARIPO), the Benelux
Organisation for Intellectual Property (BOIP) and the European Union Intellectual Property Office (EUIPO), use the Vienna Classification.

The VCL is a hierarchical system classifying all figurative elements into 29 categories, further divided into divisions and sections. Additional information can be found at WIPO VCL site [1] Table 3.2 shows the categories of the VCL.

3.3 Dataset Download & Preparation

We make freely available the scripts to download and build the dataset [2] as well as the link to download it directly [3]. Each script is modular and is supposed to be adapted to the different needs researchers might have. The pipeline proceeds as follows.

1. Download: connect to the EUIPO’s FTP server and download the files.

[1] https://www.wipo.int/classifications/vienna/en/
[2] https://github.com/lhf-labs/tm-dataset
[3] https://doi.org/10.5281/zenodo.5771006
2. Process: previously downloaded files are unzipped. Extracted images are renamed as UUIDv4 and their metadata is written into a file. Metadata includes the text contained in the image, the label associated to it and the date of the trademark.

3. Statistics: compute statistics to obtain number of images, minimum image size, maximum image size, standard deviation of image size and mean image size.

4. Filter: remove invalid images (i.e. corrupted images) and too small images whose width or height is less than 20 pixels.

5. Fix (image): transform the TIFF to JPG, rename the images to JPG and set images in fixed sizes of $256 \times 256$ and rename.

6. Fix (metadata): remove metadata of the invalid images.

7. Clean: Remove invalid images.

The dataset will consist of 256 images. Note that the total storage requirements are more than 256 GB as of December 2021.

### 3.4 Statistics

Figure 3.4 shows the trademark count by year, while Figure 3.5 shows the trademark assignment by category. The dataset is clearly imbalanced.

### 3.5 Labelling

The Vienna Classification is an international classification system used to classify the figurative elements of marks. The complete title of the Classification is International Classification of the Figurative Elements of Marks.

### 4 Applications

We foresee several potential applications of this dataset:

1. Unconditional trademark generation.
5 Baselines

In this section, we describe the baselines we built for two of the applications we mentioned, namely, logo generation and multi-label logo classification.

5.1 Trademark Generation

Awaiting results

5.2 Multi-Label Classification

We apply a neural architecture search algorithm out of the box to learn multi-label classification using Vienna categories. Specifically, a 20-layer pretrained NASNET [Zoph et al., 2017], training half of its layers. We obtain an accuracy of 0.1155 in the level 3 of the hierarchy and an accuracy of 0.2786 in the level 2, showing the difficulty of the task.

6 Conclusions & Future Work

The dataset presented in this paper is a continuously growing dataset of figurative images that is manually annotated. This dataset can be used to generate systems that proceed in the artistic generation of logos in the same way as humans do, or to develop systems that understand the abstract artistic capacity of humans.
We provided simple baselines for two tasks. We expect that the scientific community will creatively contribute new ways to use this dataset either as a benchmark or to develop downstream applications.

As future work, we suggest 1. extending the dataset with information from other offices (see WIPO), 2. segmenting the images according to their figurative marks and textual elements to conform two separate datasets ("pure" images and logos), 3. applying the dataset to other tasks (such as OCR), 4. aligning Vienna classification with other existing classifications (e.g., CIFAR), and 5. Outperforming the discriminative and generative baselines we provided.
References

Chang, M.-F., Lambert, J. W., Sangkloy, P., Singh, J., Bak, S., Hartnett, A., Wang, D., Carr, P., Lucey, S., Ramanan, D., and Hays, J. (2019). Argoverse: 3d tracking and forecasting with rich maps. In Conference on Computer Vision and Pattern Recognition (CVPR).

Cordts, M., Omran, M., Ramos, S., Rehfeld, T., Enzweiler, M., Benenson, R., Franke, U., Roth, S., and Schiele, B. (2016). The cityscapes dataset for semantic urban scene understanding. In Proc. of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR).

Deng, J., Dong, W., Socher, R., Li, L.-J., Li, K., and Fei-Fei, L. (2009). Imagenet: A large-scale hierarchical image database. In 2009 IEEE conference on computer vision and pattern recognition, pages 248–255. Ieee.

Krizhevsky, A. (2009). Learning multiple layers of features from tiny images. Technical report.

LeCun, Y. and Cortes, C. (2010). MNIST handwritten digit database.

Li, X., Liu, S., Kautz, J., and Yang, M.-H. (2018). Learning linear transformations for fast arbitrary style transfer.

Park, T., Liu, M.-Y., Wang, T.-C., and Zhu, J.-Y. (2019). Semantic image synthesis with spatially-adaptive normalization.

Ramesh, A., Pavlov, M., Goh, G., Gray, S., Voss, C., Radford, A., Chen, M., and Sutskever, I. (2021). Zero-shot text-to-image generation.

Richter, S. R., AlHaija, H. A., and Koltun, V. (2021). Enhancing photorealism enhancement. arXiv:2105.04619.

Schafer, H., Santana, E., Haden, A., and Biasini, R. (2018). A commute in data: The comma2k19 dataset.

Uzairi, A. (2021). Deep learning for identification of figurative elements in trademark images using vienna codes. Master’s thesis, Linnaeus University, Department of computer science and media technology (CM).

Yu, F., Chen, H., Wang, X., Xian, W., Chen, Y., Liu, F., Madhavan, V., and Darrell, T. (2020). Bdd100k: A diverse driving dataset for heterogeneous multitask learning.

Zoph, B., Vasudevan, V., Shlens, J., and Le, Q. V. (2017). Learning transferable architectures for scalable image recognition. CoRR, abs/1707.07012.