

Data provisioning for 3D printing defect (spaghetti) detection

Simplified version

Michał Raczkowski

15-01-2024

Contents

1	Introduction	1
2	Data Requirements	1
3	Data Collection	1
4	Data Understanding	1
5	Data Processing	2
5.1	Dataset Structure	2
5.2	Labeling Importance	2
5.3	Labeling Process	2
6	Conclusion	3

1 Introduction

This document outlines the process of data collection, processing, and labeling for training a YOLO algorithm in detecting defects in 3D printing, with a focus on the "spaghetti" issue.

2 Data Requirements

The YOLO algorithm requires labeled images that display the "spaghetti" defect in 3D prints. These images must be open-source and correctly formatted.

3 Data Collection

Data is sourced from homemade images and open-source online datasets, ensuring a focus on the "spaghetti" defect.

4 Data Understanding

The dataset comprises photos showing various 3D printing defects. The selection process involves choosing images that specifically display the "spaghetti" defect.



(a) "Spaghetti" issue[1]

(b) Layers split issue[2]

Figure 1: Two types of 3D printing issues

5 Data Processing

5.1 Dataset Structure

The dataset includes images of the defect and corresponding labels. The directory structure is organized into training and validation sets.

Directory tree:

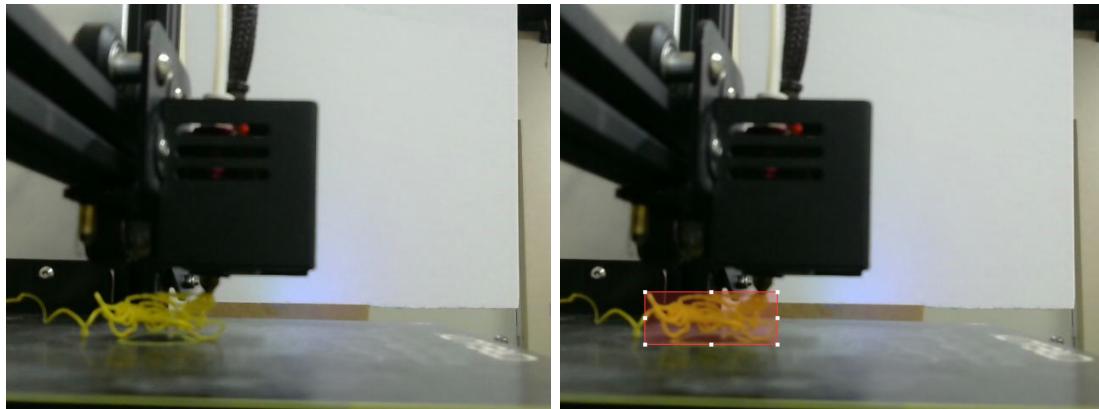
```
data/
  └── images/
      ├── train/
      │   └── ...
      └── val/
          └── ...
  └── labels/
      ├── ...
      ├── train/
      │   └── ...
      └── val/
```

5.2 Labeling Importance

Labels are crucial for training the YOLO algorithm. They provide information on object location and class within the images.

5.3 Labeling Process

We use **MakeSense** [3], a free online tool, for labeling images. Labels are exported in YOLO format.



(a) no_support_62.jpeg [2]

(b) no_support_62.jpeg (labeled)[2]

Figure 2: Comparison of image without and with label

6 Conclusion

This simplified process ensures the preparation of a relevant dataset, enabling the YOLO algorithm to effectively detect the "spaghetti" defect in 3D printing. This simplified process ensures the preparation of a relevant dataset, enabling the YOLO algorithm to effectively detect the "spaghetti" defect in 3D printi

References

- [1] Dataset: [3D-Printer Defected Dataset:](https://www.kaggle.com/datasets/justin900429/3d-printer-defected-dataset)
<https://www.kaggle.com/datasets/justin900429/3d-printer-defected-dataset>
- [2] Dataset: [3D printing errors:](https://www.kaggle.com/datasets/mikulhe/3d-printing-errors)
<https://www.kaggle.com/datasets/mikulhe/3d-printing-errors>
- [3] MakeSense: [MakeSense:](https://www.makesense.ai/)
<https://www.makesense.ai/>