중앙대학교
School of Computer Science and Engineering

Advanced Image Processing

Project: Traffic Sign Recognition

Survey and Plan

Team 5

2022-2

Contents

1. Team Introduction

Team5

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2. Project Survey and Proposal

2.1 The necessity of traffic sign recognition

Figure1. In 2017, Audi launched the Audi A8 D5 with the Autonomous Intelligent Driving (AID), an Audi's self-driving technology

Figure2. In 2015, Tesla introduced Tesla Autopilot with the Advanced driver-assistance system (ADAS)

- Nowadays, self-driving cars (Autonomous cars) have emerged as essential vehicles in transportation.
- Traffic sign recognition (TSR) is an important tool/ module in all self-driving systems/ driver-assistance systems.

Ex:

1. *TSR recognizes a speed limit sign -> informs car's driver -> driver takes a suitable action.*
2. *TSR recognizes the red light -> informs the self-driving controller -> Car stops.*

Figure3. Car with traffic sign recognition

2. Project Survey and Proposal

2.2 Proposal

- This project addresses the traffic sign recognition problem.
- To solve the problem, we utilize the Convolution Neural Network (CNN) for feature extraction and detection.
- This work follows common steps of the detection problem:

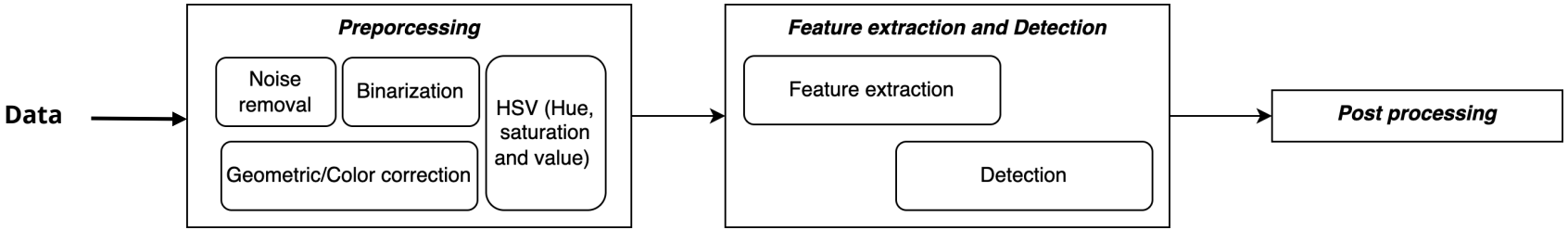


Figure4. Overall process

2. Project Survey and Proposal

2.3 Project setup

- **Dataset: German Traffic Sign Recognition Benchmark (GTSRB)**[2,3].
- *It was created from about 10 hours of video recorded while driving in Germany.*
- *It consists of about 40.000 colorful photos of traffic signs.*
- *Images have .ppm extension and their size varies from 15x15 to 250x250 pixels.*
- **Tools:**
- Coding language: *Python.*
- Libraries/ modules:

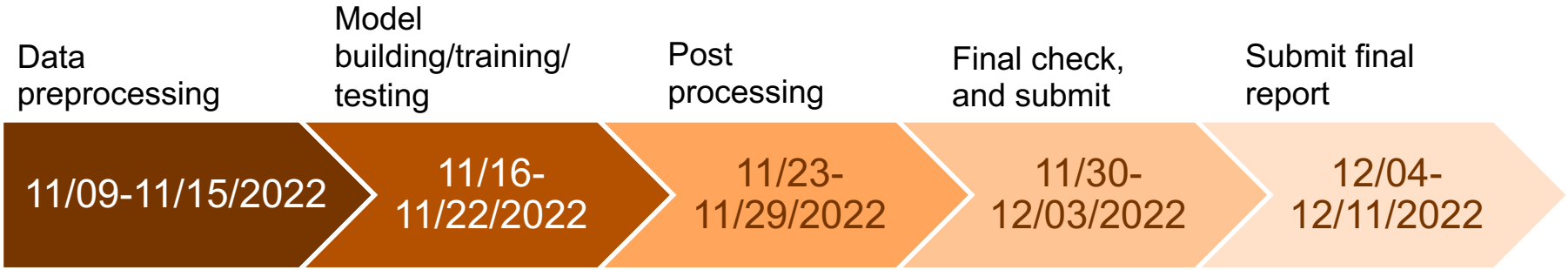
  TensorFlow, OpenCV (in&out),

  NumPy, OS, Matplotlib

- IDE: *Visual Studio.*
- Source Code: GitHub *[4]*

Figure5. Traffic sign images in GTSRB

3. Plan


Data preprocessing
11/09-11/15/2022
Model building/training/ testing
11/16-11/22/2022
Post processing
11/23-11/29/2022
Final check, and submit
11/30-12/03/2022
Submit final report
12/04-12/11/2022

References

[1] Mogelmose, Andreas, Mohan Manubhai Trivedi, and Thomas B. Moeslund. "Vision-based traffic sign detection and analysis for intelligent driver assistance systems: Perspectives and survey." *IEEE Transactions on Intelligent Transportation Systems* 13.4 (2012): 1484-1497.

[2] J. Stallkamp, M. Schlipsing, J. Salmen, and C. Igel, “The german traffic sign recognition benchmark: A multi-class classification competition,” in *Proc. IJCNN*, 2011, pp. 1453–1460. [Online]. Available: http://benchmark.ini.rub.de/?section=gtsrb

[3] https://www.kaggle.com/datasets/meowmeowmeowmeowmeow/gtsrb-german-traffic-sign

[4] https://github.com/phuongtrannam/advanced-image-processing-cau