The Autoware Model Zoo
Proposal for TSC
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What is a model zoo and what would an Autoware model zoo be?

A model zoo is...

- A central place to:
  - Organize
  - Document
  - Share
- Neural network models

AD tasks that involves neural networks

- Camera object detection
- Lidar object detection
- Object Segmentation
- Drivable area segmentation
- Lane detection
- Traffic light detection
- Junction detection
- Motion prediction

An Autoware Model Zoo

- Organize neural networks by AD tasks
- There might be multiple different models for each AD task
- There might be multiple version of the same network trained on different data
- All models come with documentation and provenance information
**Why**

Why do we need a model zoo and what does this enable?

**NN is a different type of asset to source code**

- Neural networks are different from source code
  - Large
  - Not self-explanatory
    - Require metadata information
  - Derived from a training process
    - Require provenance information

**The model zoo is for**

- The Newbie:
  - Improve out of box experience, provide early success.
  - A clear view of what is needed to run this AD stack
  - Run perception stack out of box
- The bench-marker
  - Easily extract representative workloads out of Autoware
- The Prototyper
  - Modify or improve model for people’s own needs
- The serial contributor:
  - Contribute new or improved models through a peer reviewed process.
  - Ensure models are reproducible and modifiable.

**Other things a model zoo will enable**

- Allow contribution of models that are optimized for hardware
- Allow contribution state-of-the-art models as they come out of research
- Make Autoware more attractive and credible to prototypers and researchers
Why do we need a model zoo and what does this enable?

Where to get cnn segmentation prototxt and caffe model?

Hi,

I read the README.md for lidar_apollo_cnn_seg_detect when I want to have a try on this module. The README.md only tells to download model from Apolo project repository. However, I cannot find where to download the model and prototxt. Can you please tell me the exact path to download them? Thanks very much and README.md gives description as below:

launch the node: 

```
launch lidar_apollo_cnn_seg_detect lidar_apollo_cnn_seg_detect.launch
```

network definition file: ./PATH/TS/FILE.prototxt pretrained model file: ./PATH/TS/ME/AUILTIN.caffemodel

Download models: Pre trained models can be downloaded from the Apollo project repository.

How has it gone?

Continued challenges:

- No 4-way/2-way intersection navigation logic (AS is working on this)
- Commercial-use algorithms/data sets/trained weights are limited
- Lack of standardized unit test/formatting requirements makes development challenging (AS is working on this)
- Autoware.ai need more contributors and reviewers!
How
How can we establish this model zoo?

Infrastructure

• The model zoo is a single Git repository
• Networks are stored as large files in Git Lfs
  • Both Gitlab and GitHub support Git Lfs
  • GitHub have paid plans for extra bandwidth and storage if needed
• Basic metadata information encoded in YAML file
• Extra provenance information about training and data used can be documented in markdown files or reST/Sphinx
• Contributions are pull request that are reviewed just like source code

Content

• Set-up folders corresponding to functional components that uses NN
  • camera_object_detection
  • traffic_light_detection
  • lidar_object_detection
• Collect models currently used in Autoware.ai
  • YOLOv3, MXNet, SSD, etc.
• Collect common baseline models that are publicly available.
• Retrain networks on well-known automotive datasets.
• Retrain networks on simulator datasets.
Thank You
Danke
Merci
謝謝
ありがとうございます
Gracias
Kiitos
감사합니다
धन्यवाद
شكرًا
תודה