Closed Opened 10 months ago by **mitsudome-r**

vector map converter

Related Issues & PRs

Related Issues

- https://github.com/autowarefoundation/autoware/issues/1701
- https://github.com/autowarefoundation/autoware/issues/1954

Related Merge Requests

Following merge requests should be merged before this one

- autoware!1 (merged)
- messages!2 (merged)
- common!2 (merged)

New feature implementation

Implemented feature

Add vector_map_converter which converts other map formats to Aisan vector map format.
https://github.com/autowarefoundation/autoware/issues/1954

Documentation

See the documentation inside package

Implementation description

The code was implemented by refering to Lanelet2 document, AutowareMapsFormat Document, and Aisan Vector Map document(closed).
The converters are implemented by referring to the values in related fields/classes in different formats.

Three nodes are implemented in vector_map_converter:

- autowaremap2vectormap: converts AutowareMapFormat(which was proposed in https://github.com/autowarefoundation/autoware/issues/1701) into vectormap format.
- lanelet2autowaremap: converts lanelet2 format to AutowareMapFormat (not meant to be used)
- lanelet2vectormap: converts lanelet2 format to vectormap format.
- opendrive2autowaremap: converts opendrive format to AutowareMapFormat.

Installation

Since this package requires other PRs to work (see the top section), please use this repos file for installation if you need to review before other PRs are merged. Also, some of the Lanelet2 dependencies must be installed manually:

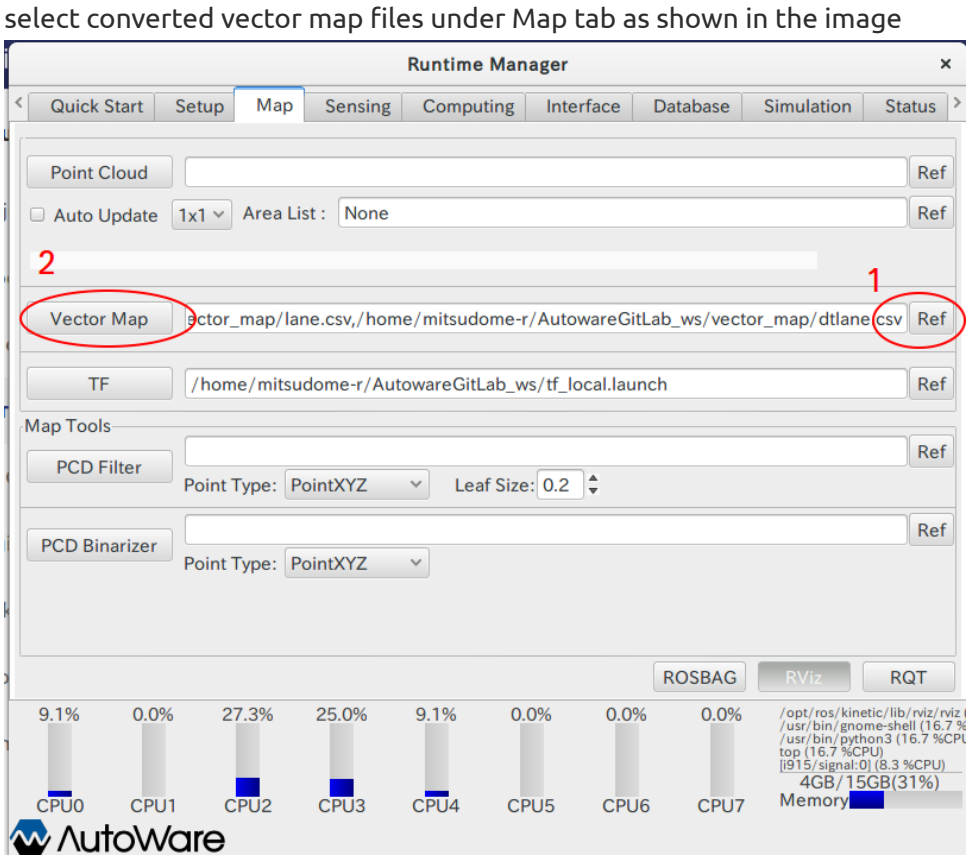
```
sudo apt-get install libboost-dev libeigen3-dev libgeographic-dev libpugixml-dev libpython-
```

Test Procedure

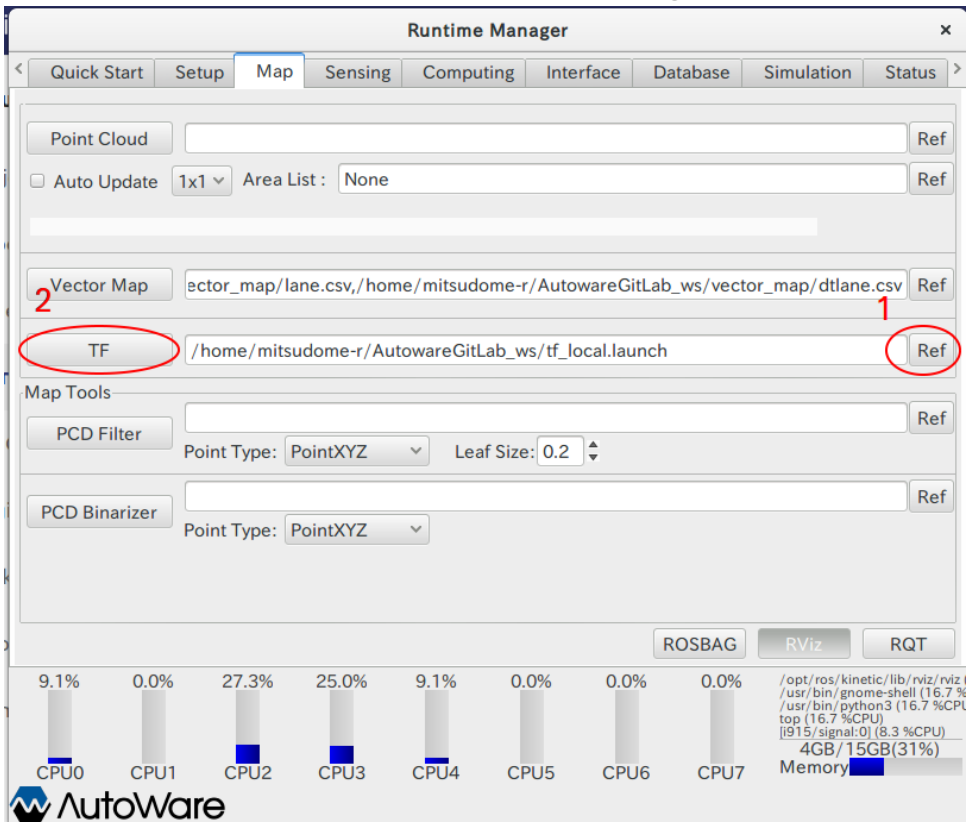
Converting from Lanelet2

1. roscore
2. mkdir converted_map
3. rosrun vector_map_converter lanelet2vectormap _map_file:=~/colcon_ws/src/Lanelet2/lanelet2_maps/res/mapping_example.osm _origin_lat:=49.00345654351 _origin_lon:=8.42427590707 _save_dir:=~/converted_map/
4. start run time manager

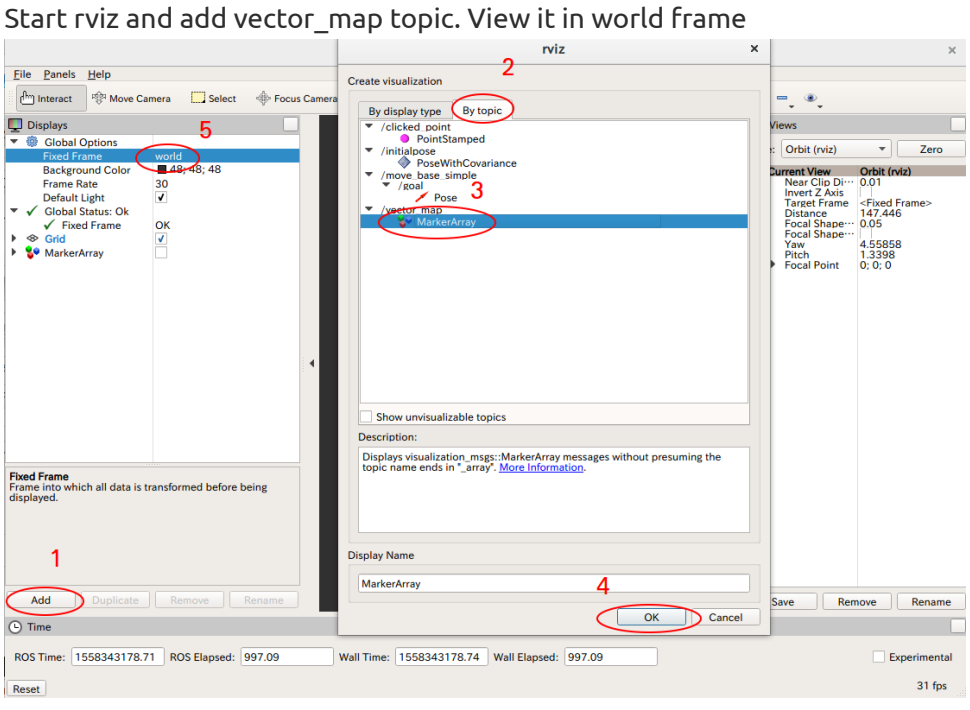
5. select converted vector map files under Map tab as shown in the image



6. Download this tf file and load from run time manager

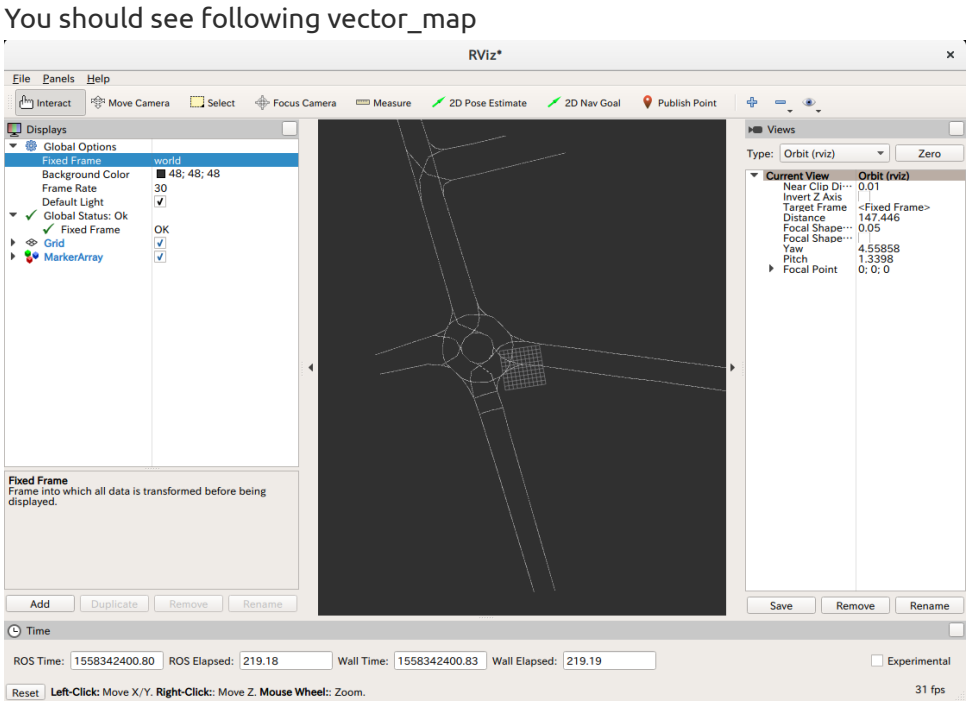


7. Start rviz and add vector_map topic. View it in world frame



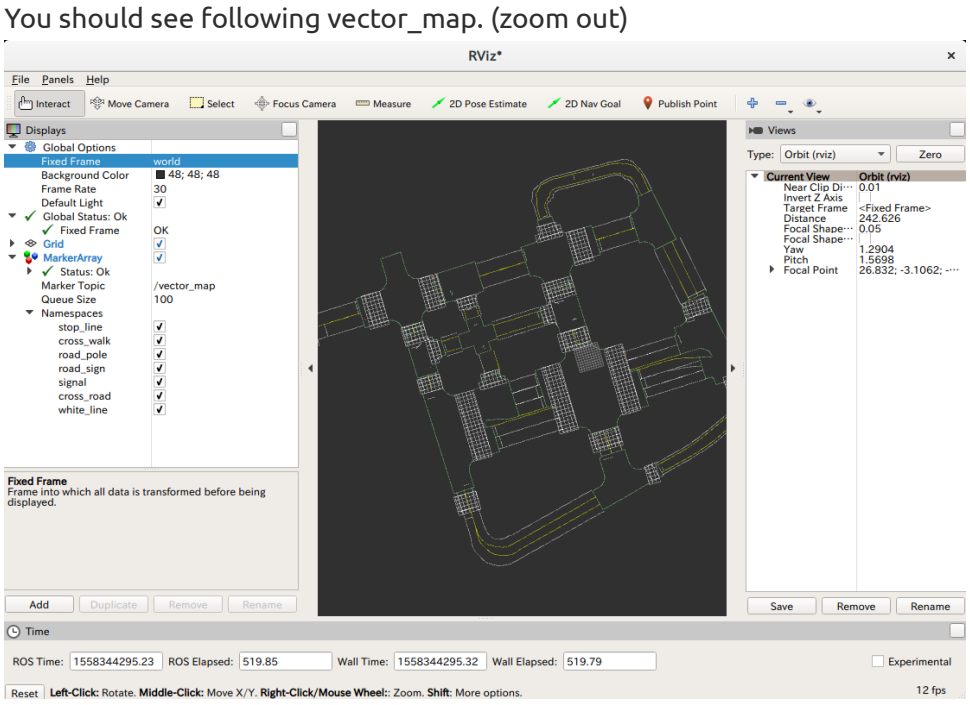
1/2 threads resolved

8. You should see following vector_map



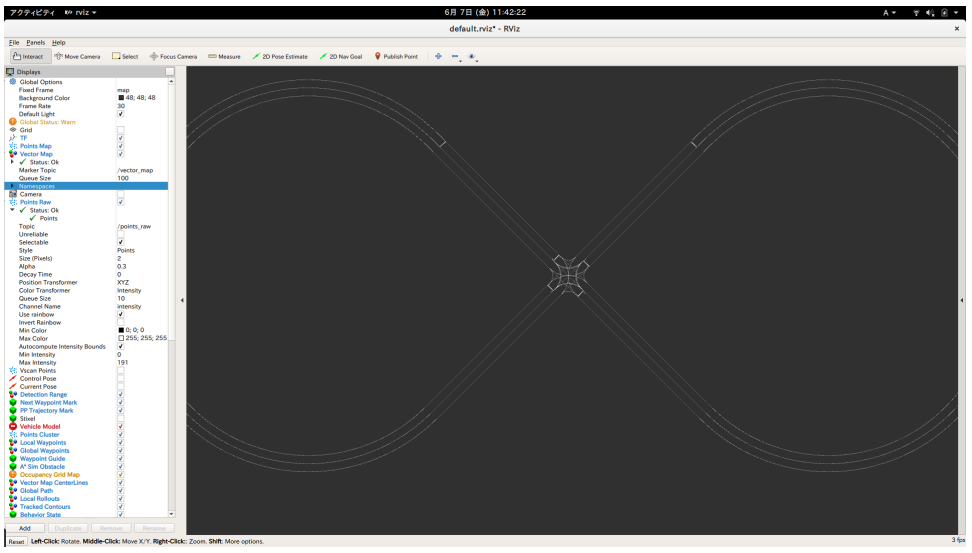
Converting from AutowareMap

1. Download autoware map sample from here.
2. roscore
3. mkdir converted_map
4. rosrun vector_map_converter autowaremap2vectormap map_dir:=autowaremap_toyostashi/ _save_dir:=converted_map/ _create_whiteline:=true
5. Load the vector_map in converted_map/ with the same step as steps 4-6 in **Converting from Lanelet2** section.
   However, use this tf file instead.
6. Set up rviz as step 7 in **Converting from Lanelet2** section.
7. You should see following vector_map. (zoom out)



Converting from OpenDrive

1. Download a map sample form OpenDrive Downloads page.
2. roscore
3. mkdir autoware_map vector_map
4. rosrun vector_map_converter opendrive2autowaremap _map_file:=Crossing8Course.xodr _country_codes_dir:=autoware/utilities/vector_map_converter/countries/ _save_dir:=autoware_map/
5. rosrun vector_map_converter autowaremap2vectormap _map_dir:=autoware_map _save_dir:=vector_map/ _create_whiteline:=true
6. Load the vector_map in vector_map/ with the same step as steps 4-6 in **Converting from Lanelet2** section.
   However, use this tf file instead.
7. Set up rviz as step 7 in **Converting from Lanelet2** section.
8. You should see following vector_map.



Edited 10 months ago by mitsudome-r

Request to merge mitsudome-r:feature/vector_map_... **into** master

Detached merge request pipeline #73065187 passed for a08b95bd
Coverage 26.75% (19.55%)

Requires approval from Maintainers.

Closed by Joshua Whitley 7 months ago

The changes were not merged into master

mitsudome-r @mitsudome-r mentioned in merge request common!2 (merged) 10 months ago

mitsudome-r @mitsudome-r mentioned in merge request messages!2 (merged) 10 months ago

mitsudome-r @mitsudome-r mentioned in merge request autoware!1 (merged) 10 months ago

mitsudome-r @mitsudome-r added 1 commit 10 months ago
- 8c8602f2 - fix index bug

Compare with previous version

mitsudome-r @mitsudome-r changed the description 10 months ago

mitsudome-r @mitsudome-r added 2 commits 10 months ago
- f91b5957 - Revert "fix index bug"
- 8b0dba9f - fix bug in node, dtlane, and whiteline

Compare with previous version

Geoffrey Biggs @gbiggs changed title from **[Merge after other related PR]Feature/vector map converter** to **vector map converter** 10 months ago

Joshua Whitley @JWhitleyWork · 10 months ago Owner

@mitsudome-r - While working on our new trafficlight_recognizer, we noticed that many, **many** signaldata were being created in the ADASMap for each traffic light in the `lanelet2` map. We see up to 12 signaldata for each light.

Ryohsuke Mitsudome @dimethylether · 10 months ago

@JWhitleyAStuff That happens when a traffic light is referred by multiple lanelets. I assume your traffic light has 3 light bulb and is linked to 4 lanelets (or 4 light bulbs and 3 linked lanelets). That would create 12 signaldata for a traffic light in converted vector map.

It was difficult to convert traffic light properly since Aisan Format traffic light cannot be linked to multiple lanes. Vector_map_server uses this information to retrieve traffic light from given waypoints, and I had to create duplicate lights for each lanes in order for the function to work with all lanes.

These are options that I considered when I wrote the converter:

1. Create duplicates of the traffic light with multiple linked lanes.
2. Do not duplicate traffic light, and just put a notice in documentation that converted vector map cannot be used by vector_map_server.
3. Only support Lanelet that has 1-to-1 relationship between traffic light and lanelet.

I chose to go with the first option because I did not want to limit the available function in Autoware, nor I did not want the user to modify their Lanelet2 map so much. However, if duplicated signaldata fails your new trafficlight_recognizer, then we can also go with option 2 or 3. I have heard that vector_map_server is slow and is not practical anyways.

Edited by Ryohsuke Mitsudome 10 months ago

Joshua Whitley @JWhitleyWork · 10 months ago Owner

@dimethylether When Aisan creates a map, does their map support `vector_map_server`? If so, I recommend we use option 3. If not, option 2 would be better. The reason this is a problem is because some of the bulb objects in the vector map are not in exactly the same place. This causes `feat_proj` to create several ROIs which are not projected to the same place on the image. I would imagine that most traffic light detectors would have a problem with this.

Edited by Joshua Whitley 10 months ago

Ryohsuke Mitsudome @dimethylether · 10 months ago

@JWhitleyAStuff I believe all of their map has 1-to-1 relationship between lanes and traffic light, which means they support `vector_map_server`. Let's go with option3. I will put notice in the documentation, and also implement validation on this.

Besides, the position of the ROI should be projected to the same place, since it should be the duplicate. I'm curious what is causing your problem. Could you post the image of the ROI you are talking about?

Ryohsuke Mitsudome @dimethylether · 10 months ago

Nevermind, I have looked into some of the Aisan's vector map, including the moriyama vector map from Autoware wiki page. It seems like link information between traffic light and lanes are not valid, which means vector_map_server won't work in some of their map. Maybe we can go with option 2.

Edited by Ryohsuke Mitsudome 10 months ago

mitsudome-r @mitsudome-r marked as a **Work In Progress** 10 months ago

mitsudome-r @mitsudome-r added 5 commits 10 months ago

- af388a3f - add error message

Toggle commit list

mitsudome-r @mitsudome-r added 7 commits 10 months ago

- 49c831e4 - add opendrive2autowaremap to vector_map_converter

Toggle commit list

mitsudome-r @mitsudome-r changed the description 10 months ago

mitsudome-r @mitsudome-r unmarked as a **Work In Progress** 10 months ago

mitsudome-r @mitsudome-r changed the description 10 months ago

mitsudome-r @mitsudome-r · 10 months ago

I have fixed the traffic light issues and added opendrive converter as well.

Geoffrey Biggs 🙃 @gbiggs assigned to @amc-nu and @sgermanserrano 10 months ago

mitsudome-r @mitsudome-r added 3 commits 9 months ago

- b655fdd5 - remove autoware_map_msgs::Route and autoware_map_msgs::RouteArray
- 6fdb92c5 - update description in autoware_map/package.xml
- daeba753 - update description in vector_map_converter/package.xml

Compare with previous version

mitsudome-r @mitsudome-r added 1 commit 9 months ago

- 028ddc26 - fix bug in splitLine function

Compare with previous version

mitsudome-r @mitsudome-r added 1 commit 9 months ago

- d949296c - update README about origin for lanelet2vectormap

Compare with previous version

Joshua Whitley @JWhitleyWork · 9 months ago Owner

@mitsudome-r - Can you merge or rebase on the current `master`? This will help us diagnose CI problems around lanelet2.

Edited by Joshua Whitley 9 months ago

Joshua Whitley @JWhitleyWork started a thread on an old version of the diff 9 months ago
Resolved by Joshua Whitley 9 months ago

Joshua Whitley @JWhitleyWork · 9 months ago Owner

I also receive a segmentation fault when attempting to convert a map in `lanelet2` format with the command: `rosrun vector_map_converter lanelet2vectormap _map_file:=<path_to_osm_file> _origin_lat:=0 _origin_lon:=0 _save_dir:=<path_to_save_dir>`. This might be because of the origin lat/lon of 0 but I assumed that, since every point in the map is geo-referenced correctly (has lat/lon) that this would work. Did I misunderstand the purpose of these arguments? Either way, you should probably add fault handling for this case.

After testing: All attempts while using `melodic` fail with a segfault. Attempts with the example file in `kinetic` work correctly but using our own map file in `kinetic` also segfaults.

Edited by Joshua Whitley 9 months ago

mitsudome-r @mitsudome-r added 11 commits 9 months ago

- d949296c...accfdac5 - 10 commits from branch `autowarefoundation/autoware.ai:master`
- 3f70ee09 - Merge remote-tracking branch 'autowarefoundation/master' into feature/vector_map_converter

Compare with previous version

mitsudome-r @mitsudome-r added 3 commits 9 months ago

- cf9ea50c - add type specifier for opposite_lane
- 6b200d9c - remove unrequired cout
- 6401a197 - change ROS_ERROR to ROS_WARN for lanes with multiple traffic lights

Compare with previous version

mitsudome-r @mitsudome-r · 9 months ago

@JWhitleyAStuff Thank you for reviewing. Although lat/lon will be converted into geo-referenced(MGRS) x,y,z, it will be converted to relative x,y,z using UTM projection first. Therefore, you have to assign origin somewhere close to your map. I will fix this by 1.13 since this MR was dropped for 1.12.

Either way, you should be at least able to finish the conversion without segmentation fault so your issue probably comes from other cause.

Do you see any output before segmentation fault? Also, could you try running `rosrun lanelet2_validation lanelet2_validate <your_map_file>` , and tell me the output?

Joshua Whitley @JWhitleyWork resolved all discussions 9 months ago

Joshua Whitley @JWhitleyWork · 9 months ago Owner

@mitsudome-r - The validator also segfaults when attempting to load our map. I'll see if I can work on that upstream. Since the converter appears to work on pristine examples, I'm good approving this for now.

Just as a note, we will either need to wait for https://github.com/KIT-MRT/mrt_cmake_modules/pull/4 and https://github.com/ros/rosdistro/pull/21570 to be merged to fix `rosdep` issues or add a work-around to CI and modify the build instructions for Autoware. I'm waiting to hear back from other maintainers on their preferred path forward. In the mean time, I've made an MR mitsudome-r/utilities!1 (merged) to your fork to get CI going on the regular builds (not the cross-builds, though - those will be fixed soon).

Edit: Looks like there are some test errors in `lanelet2_routing` that cause build failures also. I'll work upstream on this too.

Edited by Joshua Whitley 9 months ago

Joshua Whitley @JWhitleyWork mentioned in merge request autoware!8 (merged) 9 months ago

Joshua Whitley @JWhitleyWork changed milestone to %1.13.0 Release 9 months ago

mitsudome-r @mitsudome-r added 1 commit 9 months ago

- 83c5d350 - fix splitlane function

Compare with previous version

Joshua Whitley @JWhitleyWork added enhancement label 9 months ago

mitsudome-r @mitsudome-r added 1 commit 9 months ago

- e151652e - fix typo

Compare with previous version

Joshua Whitley @JWhitleyWork · 8 months ago Owner

@mitsudome-r - I've created another MR on your fork to rebase on the current `master` branch of this repo and fix CI for at least the x86 builds. The cross-builds will be fixed upstream soon. Here is the MR: mitsudome-r/utilities!2 (merged). Once they have fixed the `mrt_cmake_modules` cross-build issue upstream, I'll also create an MR to `autoware` to add `lanelet2` and `mrt_cmake_modules` to `autoware.ai.repos` in preparation for this MR.

Joshua Whitley @JWhitleyWork mentioned in merge request autoware!14 (merged) 8 months ago

mitsudome-r @mitsudome-r added 61 commits 8 months ago

- e151652e...4179ce5b - 35 commits from branch

Toggle commit list

mitsudome-r @mitsudome-r · 8 months ago

@JWhitleyAStuff Thank you! I have merged your MR, and CI seems to pass now.

Joshua Whitley @JWhitleyWork · 8 months ago Owner

@mitsudome-r - I am still working on some CI failures in autoware!14 (merged). Once I have those straightened out and the necessary packages added to Autoware, I will review this MR again.

Joshua Whitley @JWhitleyWork · 7 months ago Owner

@mitsudome-r - Lanelet2 and `mrt_cmake_modules` have been successfully added to the `autoware.ai.repos` file and are building correctly. I'll go through the code now for a review. However, we may want to discuss (maybe with @gbiggs) trimming this MR down since the "Autoware Format" for mapping no longer seems to have any traction - as far as I can tell. The conversion between Lanelet2, OpenDrive, and Aisan formats is still very useful and necessary but I don't know if we want to add another "AutowareMap" format at this time given that the Autoware Map Format Working Group is specifically targeting AutowareAuto with their mapping format changes. Thoughts?

mitsudome-r @mitsudome-r · 7 months ago

@JWhitleyAStuff

Thank you for updating autoware.ai.repos.

I do agree that we want to remove AutowareMap format since it will confuse users and the WG. The problem is that this was originally a converter for AutowareMapFormat(AMF)->Aisan format before we decided to go with Lanelet2 and OpenDRIVE, and other converters are built on top of it, which means other formats (Lanelet2 and OpenDRIVE) are converted into Aisan format via AMF. This was because Aisan format seemed to have more complex structure than AMF, and it was easier to create converter to AMF than directly into Aisan format. Now that I got familiar with the map formats after creating this MR, I think I will be able to change the implementation if we need to, but it could take decent amount of time. I am currently busy on creating MR for Lanelet2 implementation nodes(e.g. feat_proj, lanelet2maploader, etc) so this MR might have to wait for a while for modification. Another workaround I can think of is to leave core implementation as is and just remove nodes related to AMF such as opendrive2autowaremap and lanelet2autowaremap to "hide" the existence of AMF to avoid the confusion.

Collapse replies

Joshua Whitley @JWhitleyWork · 7 months ago Owner

Do you think it would be more work to modify this MR to drop the AMF or to just create a new MR with converters from Lanelet2 -> Aisan and OpenDrive -> Aisan?

mitsudome-r @mitsudome-r · 7 months ago

I think I can create a new MR for Lanelet2->Aisan and OpenDRIVE->Aisan

Kenji Miyake @kenji-miyake · 7 months ago

Hello.

I'll work on the tasks.
First I'll develop Lanelet2 -> Aisan direct converter, not using AMF.
After that, I'll work on OpenDrive -> Lanelet2 converter.
These would be different MRs so that reviewers can review easily.

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btw, I'm not sure what converters to support.
In my opinion:

Necessary

- Lanelet2 -> Aisan
  To support old applications which can only work with Aisan format.
- OpenDrive -> Lanelet2
  To create HDMap from simulation models.
- Lanelet2 -> OpenDrive
  To create simulation models from HDMaps which is created by Tier4's new HDMap builder.

Not necessary

- Aisan -> Lanelet2
  Since Aisan will be removed around v1.14.
  I think users who require Lanelet2 Map should re-create HDMap in order to create the complete one.
  If they use converters, some information might be dropped.

- OpenDrive -> Aisan
  Since it can be done by OpenDrive -> Lanelet2 -> Aisan.

@JWhitleyAStuff @mitsudome-r What do you think?

Edited by Kenji Miyake 7 months ago

Joshua Whitley @JWhitleyWork · 7 months ago Owner

@kenji-miyake I think this sounds perfect. Thank you both for working on this!

Please register or sign in to reply

Joshua Whitley @JWhitleyWork · 7 months ago Owner

Closing this MR in favor of one that @kenji-miyake will create for Lanelet2 -> Aisan, Lanelet2 -> OpenDrive, and OpenDrive -> Lanelet2 converters.

Joshua Whitley @JWhitleyWork closed 7 months ago

Kenji Miyake @kenji-miyake mentioned in merge request !36 (merged) 7 months ago

Please register or sign in to reply