Tutorial

1. Detection in Video Stream

⇒ Description: This tutorial teaches you how to use this package for tag and tag bundle detection in a video stream.

1. Parameter Setup

ⓐ Config/Settings.yaml

⇒ This file sets parameters for the core AprilTag 2 algorithm and for the ROS wrapper.

- tag_family

- Make sure tag_border corresponds to your tags' black border bit width (typically 1)

- tag_threads allows certain parts of the core AprilTag 2 algorithm to run parallel computations

- Setting tag_decimate>1 allows to decimate (reduce the resolution) of the image by that amount.

  ↳ This makes the core AprilTag 2 algorithm faster but means that smaller tags are less likely to be detected. Pose estimation and decoding still happens with the full-resolution image.

- Setting tag_blur>0 blurs the image and tag_blur<0 sharpens the image

- Setting tag_refine_edges=1 improves the detection fit to the tag, thus the corner detection precision, thus the pose estimation accuracy. Not computationally expensive and recommended to be on (1).

- Setting tag_refine_decode=1 reducecs the false negative detetion rate.

- Setting tag_refine_pose=1 improves the estimated pose accuracy but is computationally expensive.

- Setting tag_debug=1 will save the AprilTag 2 algorithm's intermediate images into ~/.ros. This is useful for debugging a bad detection and should be used typically only with the single image detector.

- Setting publish_tf=true will publish the detected tags' and tag bundles' poses over the /tf topic.

```
tag_family:        'tag36h11'
tag_border:        1
tag_threads:       2
tag_decimate:      1.0
tag_blur:          0.0
tag_refine_edges:  1
tag_refine_decode: 0
tag_refine_pose:   0
tag_debug:         0
publish_tf:        true
```
{ Example }

ⓑ Config/tags.yaml

⇛ This file defines the standalone tags and tag bundles that should be looked for in the input image.

⇛ Rogue tags (i.e. those that are not defined in config/tags.yaml) will be ignored.

IMPORTANT:

↪ No tag ID should appear twice with different sizes

↪ No tag ID should appear twice in the image

↪ It is fine for a tag with the same ID to be listed both in standalone_tags and in tag_bundles, as long as it has the same size.

↪ Make sure that you print yours tags surrounded by at least a 1 bit wide white border

↪ The core AprilTag 2 algorithm samples this surrounding white border for creating a light model over the tag surface

```
standalone_tags:
  [
    {id: 10, size: 0.15},
    {id: 20, size: 0.1},
    {id: 30, size: 0.07}
  ]
```

{Example}

2. Detection in a Single Image

⇛ The setup is of config/settings.yaml and config/tags.yaml is identical to the video stream detector.

⇛ Here you must set the camera intrinsics fx, fy, cx and cy.

↪ You obtain these parameters typically from a camera intrinsics calibration