PEER REVIEW – 'SENSOR FUSION METHODS FOR OBJECT DETECTION'

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1 Abstract

Environment perception is an important aspect of autonomous driving, and various sensors including Cameras, LIDAR, RADAR and depth sensors are used to achieve it. However, all of the sensors have their limitations. Sensor fusion methods can be used to overcome those limitations, along with improving upon the accuracy of individual sensors.

The different classes of sensor fusion methods discussed in this paper are:

1. Multi-view Fusion methods, fuse the input from multiple camera sources in order to extract depth map. For the extraction of depth map, the camera poses should be known, and this information is not available in most cases.

2. Direct Point Cloud Processing methods, process the 3D point cloud representation by LIDAR sensors, but these methods tend to be computationally expensive due to vast point space.

3. Depth encoding methods, as suggested by the name, encode the depth into a separate channel with the inputs, however, this representation results in information loss.

4. Project Cloud Projection methods, deal with the LIDAR point cloud data by projecting it to multiple views. This projection results in a complex fusion process.

The authors concluded that, using depth information obtained from the LIDAR sensor provides a major boost in accuracy, compared to using only the images. Secondly, data representation within the sensor fusion framework, plays an important role towards getting good results.

The conclusions obtained by the authors are supported well by the results.

2 Exceptional Aspects

Abdul Hannan Khan and Vlaicu Cosmin compiled, all of the information in an intuitive manner. For each sensor fusion method type, they provided a concise paragraph

for the reader to get a general idea and then they carry on with a more detail perspective.

The language used in the paper is coherent and easy to understand. The sentences are well-formed which convey the meaning to the reader upon reading them one time.

The authors refrain from sharing too many minor details while getting the key points across to the reader.

In short, I found the paper to be very well-structured and easy to digest.

3 Notable Aspects

The figures are described in a very detailed manner. A step by step explanation of all the model architectures represented in the paper, is provided.

The authors exhibit a good understanding of all the key concepts discussed in the paper. No vague concepts are introduced.

4 Improvements

4.1 Future Work

The authors did not come up with a proposal/idea which can be pursued further, in light of all the different sensor fusion methods which they reviewed.

4.2 References

While reviewing different aspects of the methods, the authors do not refer to the specific sections within the respective research papers. This makes it harder for the reader to find additional information directly from the research papers.

4.3 Equations

It is mentioned that the equation 1 is the learnable symmetric function, which is used to handle the issue of huge representation space of the point cloud and the equation 2 is an energy function. Despite that information, a complete explanation of each term of the equations is not provided.

4.4 Missing numbering

The third equation in the paper, which represents the deep continuous convulational operation, is not numbered. This causes it to be inconsistent with the other two equations.

5 Conclusion

I found the paper to be an interesting read. I didn't find it hard to understand and I think it got the key points across regarding sensor fusion methods in an effective manner.