# TASK 1

## Paper Title:

Analysis of Hamming and Hausdorff 3D distance measures for complex pythagorean fuzzy sets and their applications in pattern recognition and medical diagnosis

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# 1 Summary

## 1.1 Motivation

The motivation behind this work was actually improve the existing distance measures (DisMs) for complex Pythagorean fuzzy sets (CPyFSs) introduced by Ullah et al. this could be able to improve the handling of fuzzy information in real-life applications. The hypothesis is that the proposed DisMs will satisfy the axiomatic definition of complex Pythagorean fuzzy DisMs.

## 1.2 Contribution

The paper introduces a new DisM for CPyFSs by combining the 3D Hamming distance with the Hausdorff distance, demonstrating that it satisfies the axiomatic definition of complex Pythagorean fuzzy DisMs.

The paper also presents other new complex Pythagorean fuzzy DisMs. The effectiveness of these measures is illustrated through applications in building material recognition and medical diagnosis problems.

## 1.3 Methodology

They constructed an example to illustrate that a DisM proposed by Ullah et al. does not satisfy the axiomatic definition of complex Pythagorean fuzzy DisM. 2. Then, proposed a new DisM for CPyFSs, which is proved to satisfy the axiomatic definition of complex Pythagorean fuzzy DisM. Later presented some other new complex Pythagorean fuzzy DisMs. Finally, to test that the proposed work is working, they applied the proposed DisMs to a building material recognition problem and a medical diagnosis problem to illustrate the effectiveness of our DisMs. 5. We aim to compare the proposed work with some existing measures is to enhance the worth of the derived measures.

## 1.4 Conclusion

The paper concludes that the new DisMs for CPyFSs, as proposed in the paper, provide reasonable results and satisfy the axiomatic definition of complex Pythagorean fuzzy DisMs. The comparative analysis of the proposed measures in real-life problems demonstrates their effectiveness.

# 2 Limitations

## 2.1 First Limitation

One particular distance measure (WD2 CPyFS) is mentioned as unreasonable because it does not satisfy the axiomatic definition of complex Pythagorean fuzzy distance measures, a discrepancy in the result.

## 2.2 Second Limitation

The were more scope to explore additional mathematical and aggregation operators to improve the versatility and utility of CPyFS in various domains such as road signals, computer networks, game theory which were not discussed in the paper.

## 3 Synthesis

The paper contributes to the field of complex fuzzy sets by introducing new distance measures that address the limitations of existing approaches, making them suitable for applications involving fuzzy information in various domains. The paper's findings provide valuable tools for decision-making and pattern recognition within the CPyFS framework because Fuzzy logic is often used to model human reasoning and make decisions in situations where things are not strictly black and white. It is a way of dealing with uncertainty and imprecision in decision-making. It is like a spectrum of possibilities, where something can be partially true and partially false since most of the work in Artificial Intelligence as u delve down further, remains on a grey scale with a range of possibilities of decision-making parameter on the verge of being more “human-like”

The ideas presented in the paper primarily revolve around the development of new distance measures for complex Pythagorean fuzzy sets (CPyFSs) to improve the handling of fuzzy information in real-life applications. The paper's applications in building material recognition and medical diagnosis demonstrate the practical utility of the proposed measures.