The research paper "*Automatic Generation and Detection of Highly Reliable Fiducial Markers under Occlusion*[[1]](#footnote-1)" by Salinas et. al addresses challenges of generating and detecting reliable fiducial markers for use in augmented reality (AR) applications. Fiducial markers are visual tags used to anchor virtual objects in the real world. Occlusion is when part of the marker is obstructed from view, making them difficult to detect.

The authors address this by proposing a generative algorithm to evolve fiducial markers through a process of mutation and selection to optimize for occlusion. A machine learning (ML) algorithm evaluates the fitness of each marker based on its detection rate under different obstructive conditions. Using a variety of techniques involving color map, depth, and 3D model-based approaches, they achieved an average detection rate of 97% (compared to just 77% for existing markers)! They tested different lighting conditions, distances, and camera angles, performing consistently well across these scenarios.

The authors conclude that their approach is a significant improvement over current methods and has the potential to be used in various AR and computer vision applications, such as object tracking, robotics, and medical imaging. Possible extensions to the method could include using OpenCV's ArUco module[[2]](#footnote-2), which produces markers like the ones in the paper and could be generated / detected using similar algorithm machine learning techniques. It would be helpful if the authors explained more about their fitness criteria or how the ML-based detection system was trained to replicate.

In summary, the authors’ approach is novel and effective. By combining machine-learning techniques with generative algorithms, AR environments will continue to be mapped out more quickly, accurately, and can be used with established computer vision libraries such as OpenCV.

1. [https://www.researchgate.net/](https://www.researchgate.net/publication/260251570_Automatic_generation_and_detection_of_highly_reliable_fiducial_markers_under_occlusion) [↑](#footnote-ref-1)
2. [Detection of ArUco Markers](https://docs.opencv.org/3.4.0/d5/dae/tutorial_aruco_detection.html) [↑](#footnote-ref-2)