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Workplace Assisting Augmented Reality (WAAR)

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INTRODUCTION

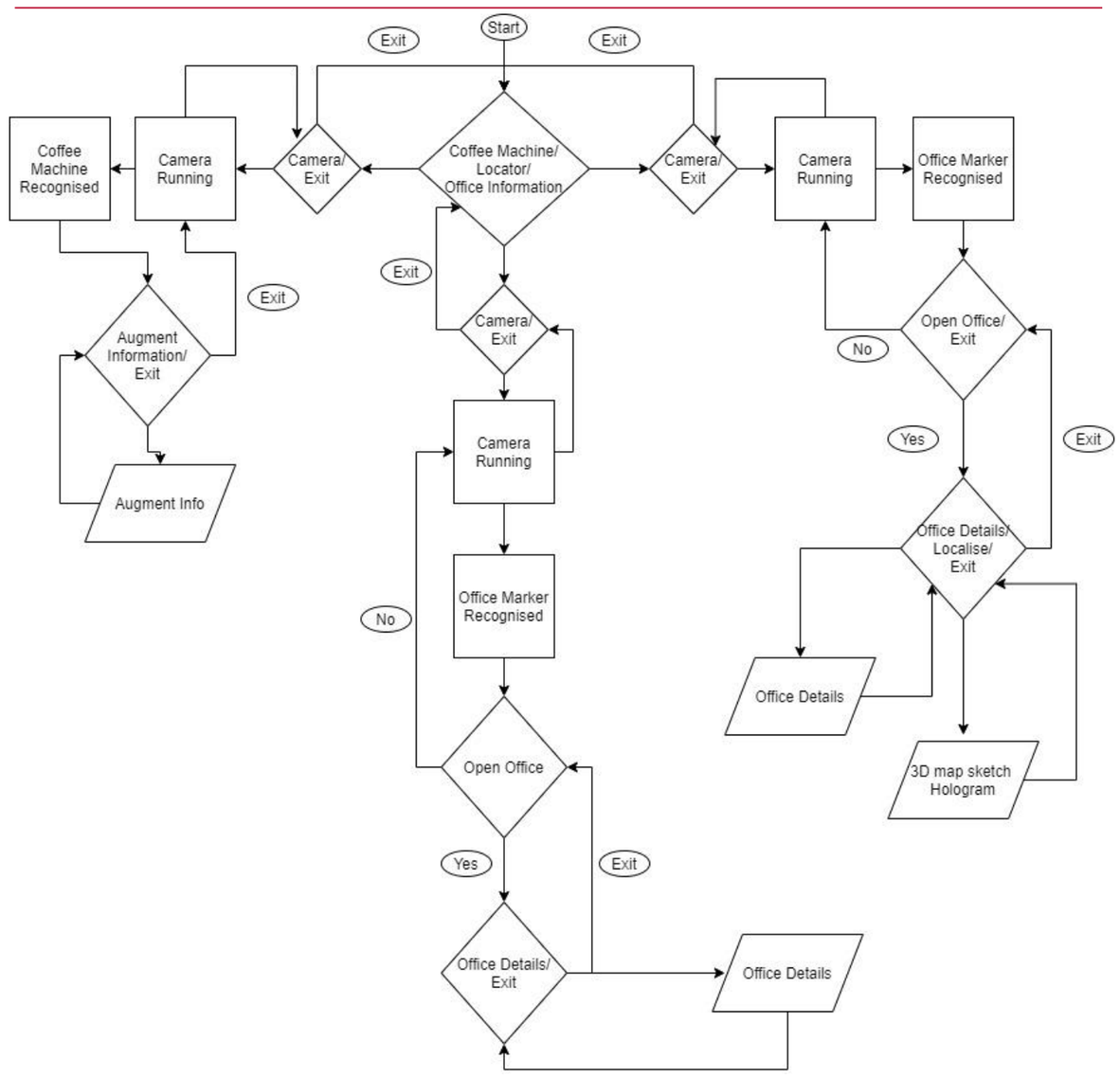
Starting a new job in an office can be very stressful for an intern or a new employee, especially on their first day at the office. The first month at the workplace might seem overwhelming for new employees. Therefore, during their first few months of settling and adjusting, the company may allow "a period of learning how to 'fit in' and adjusting to how things work in the new setting"[1] for the employee's benefit.

Providing an assistant AR application to help speed up the process for the employee to adjust to their new workplace environment may offer several challenges. However, such challenges may be overcome using a combination of A.I. techniques that may help in providing efficient image and object recognition, through a combination of deep learning and traditional computer vision as well as user profiling techniques for filtering information.

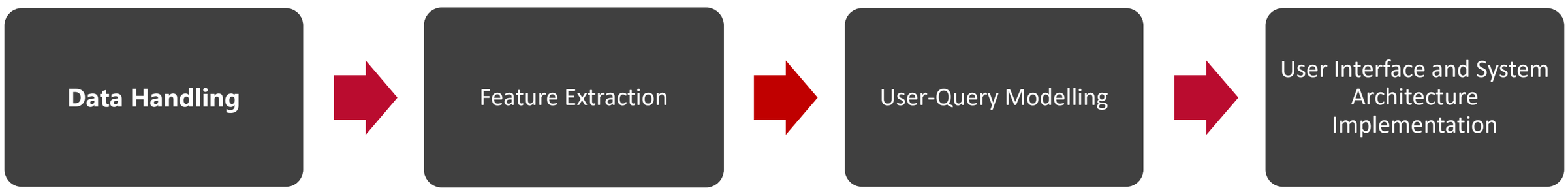
AIM

The aim of this project is to research and develop a workplace assistant augmented reality application, using image and object detection provided by Vuforia [2,3], and filtered through user profiling, using Unity to build the system's architecture. The objectives are to perform image and object detection using Vuforia, use the latter techniques to overlay information to provide assistance via AR, perform user profiling through a recommendation based system using a combination of an SVD++ [4] model and item to item based similarity for collaborative and similarity based filtering respectively, to filter out unnecessary information for augmentation, and finally to apply and evaluate the artificially intelligent techniques through quality and quantity testing.

ARCHITECTURE DESIGN



METHODOLOGY



RESULTS

The SVD++ model achieved average Root Mean Square Error and Mean Absolute Error of 3.1226 and 2.6866 respectively. In comparison to other baselines it has obtained the lowest RMSE and MAE values, hence making it the most efficient filtering model to apply. The AR application obtained on average a distance variance of 130 cm and 150 cm for image and model targets respectively, a 270 degrees of rotation variance for both targets, and an average occlusion variance of 0.55% and 0.64% for image and model targets respectively. The system obtained on average positive qualitative results via user-feedback along with recommendations on how it may be further improved.

CONCLUSIONS AND FUTURE WORK

The application may be further improved by applying location based augmented reality to precisely augment information in specific locations. Explainable AI may help in interpreting the A.I. models applied which may help keep transparency with the users. Interactive AR may be further developed thus enabling the user to interact with real world object through the application. The results obtained are not surprising and are indeed promising, highlighting the fact that augmented reality can be applied to the real world using the techniques mentioned in the aim. It was thus beneficial to achieve successfully the results. However, one should not ignore or overlook the fact that there will always be room for improvement and innovation.

REFERENCES

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