UNMANNED AERIAL MONITORING AND INFORMATION MANAGEMENT OF AGING STRUCTURES

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OUTLINE

- Background of the topic
- Statement of the Problem
- Objectives
- Significance
- Scope
- Methodology

BACKGROUND

STATEMENT OF THE PROBLEM

- The main problem is that merely relying on visually inspecting an aging structure using the human eye can differ in results from one inspector to the other.

- Also, some clear sign of a major damage may be out of sight to the human eye and the safety of the inspectors maybe at risk while doing the inspection.

OBJECTIVES

Main Objectives:

- Develop a system that will autonomously gather, process and transmit the status of the old buildings and bridge condition.
- Develop an app for information management

Specific Objectives:

- Use an unmanned aerial vehicle capable of acquiring sufficient data on favorable flying conditions.
- Develop a robust system to autonomously perform the necessary process in raw data gathering.
- Develop an efficient post-processing algorithm to simplify the raw gathered information into segmented aging structure condition data.
- Develop an app that will update in regular intervals the status of aging structure condition data as well as the status of the safety and integrity of the buildings.

SIGNIFICANCE

- The study will be of help to engineers/inspectors of aging structures
- DPWH and similar agencies will benefit, since monitoring and updating data on structure condition will be more efficient.
- Public will be safe knowing that these aging structures are far from causing damage.
- The study can help in the assessment of seismic risks.

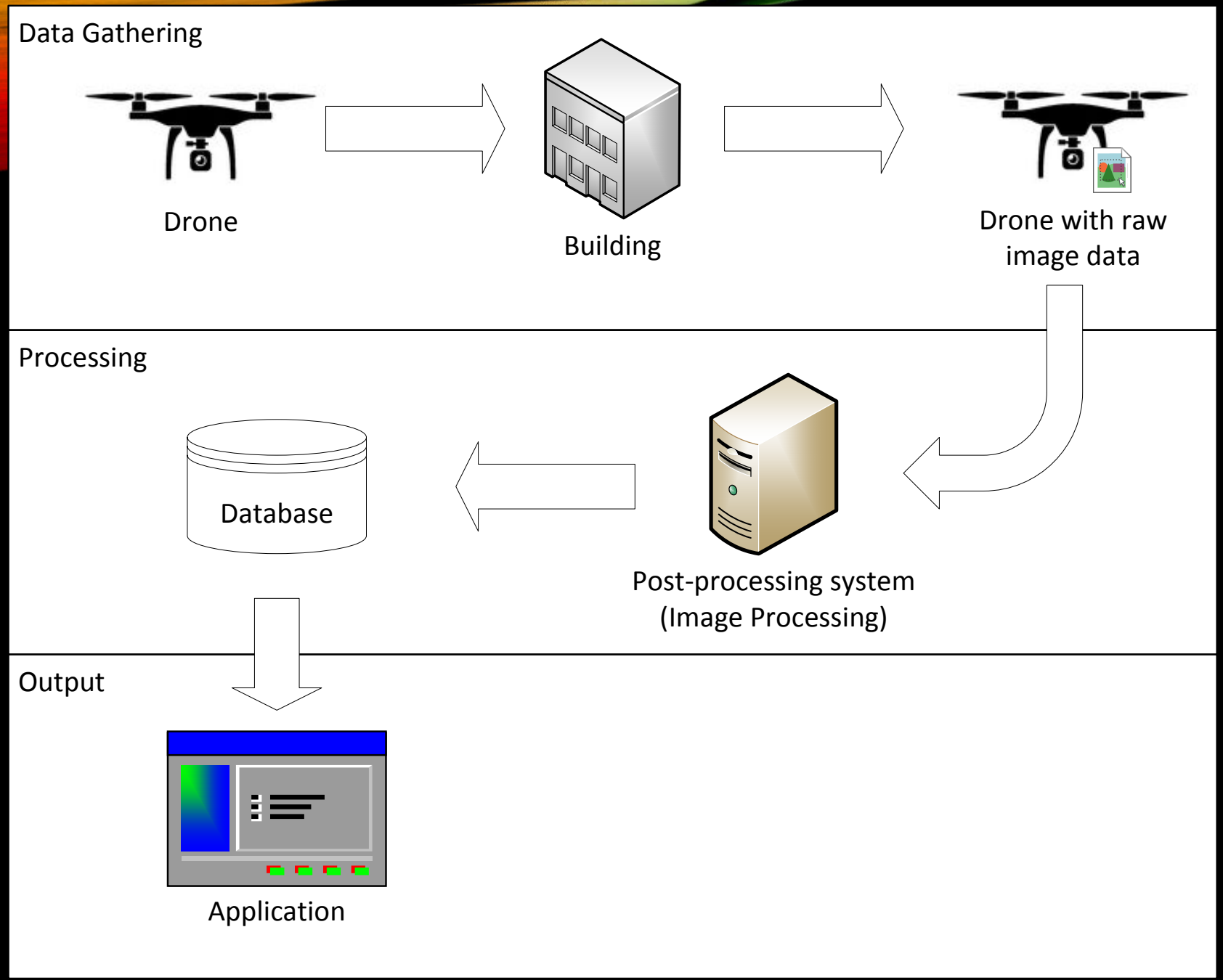
SCOPE AND LIMITATIONS

- The study focuses on historical structures found in Intramuros. Like the San Agustin Church.
- Only the exterior part of these structures will be used for testing
- The parameters to be considered are the number of cracks, crack length, and crack width.
- An unmanned aerial vehicle or UAV will be used to monitor the chosen structures.
- The development and improvement of the UAV system will primarily focus on modifying commercially available UAVs for easier system integration and to be able perform autonomous commands

RESEARCH PHASES

1. Development and Improvement of the UAV system
2. Development of Autonomous system for raw data collection
3. Development of Control Center infrastructure, processes and algorithms
4. App development and software integration
5. Systems Integration
6. Soft Tests
7. Field deployment

LOGICAL FRAMEWORK



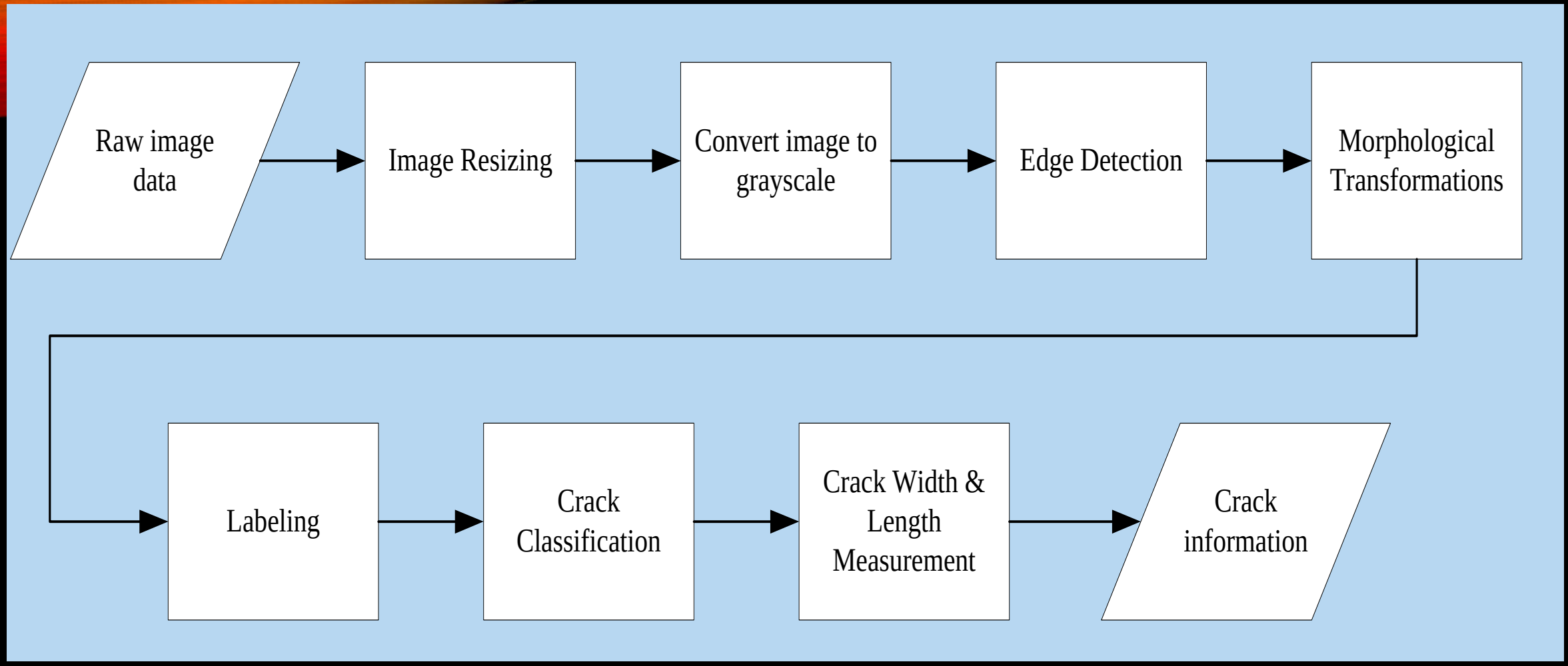


IMAGE PROCESSING FLOW

REFERENCES

- Park, M. and Kim E. (2015). Structure Safety Inspection System Using Multiple Sensors and PTZ Camera. *ICACT Transactions on Advanced Communications Technology (TACT),* Vol. 4 (3), pages 614-619
- Choudhary, G. K., and Dey, S. (2012). Crack Detection in Concrete Surfaces using Image Processing, Fuzzy Logic, and Neural Networks . *2012 IEEE fifth International Conference on Advanced Computational Intelligence(ICACI).* Nanjing, Jiangsu, China.
- Eschmann, C., and C.-M. Kuo, C.-H. K. (2012). Unmanned Aircraft Systems for Remote Building Inspection and Monitoring. *6th European Workshop on Structural Health Monitoring - Th.2.B.1.*
- Kim, H., Sim, S., & Cho, S. (2015). Unmanned Aerial Vehicle (UAV)-powered Concrete Crack Detection based on Digital Image Processing. 6th International Conference on Advances in Experimental Structural Engineering. University of Illinois, Urbana-Champaign, United States.
- Prasanna, P., Dana, K. J., Gucunski, N., Basily, B. B., La, H. M., Lim, R. S., & Parvardeh, H. (2016). Automated Crack Detection on Concrete Bridges. IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING, VOL. 13, NO. 2.