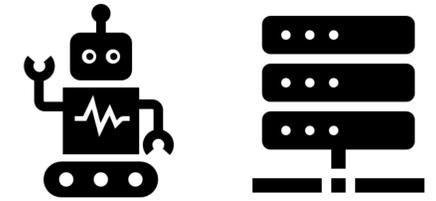


# Development of an Intelligent Green Roof Maintenance System

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## Background

Green Roofs are one of the green infrastructures that is increasingly constructed all around the world currently. However, green roofs require regular maintenance to ensure it is in a good condition. Maintenance procedures include irrigation, using herbicide, and drainage. The importance of this project is that it seeks to explore a new trend to green roof development.

## Research Objectives

The objectives of this study are to analyze the development of green roofs in various countries and propose an intelligent green roof maintenance system. The study will determine whether the system can be applied to the current environment based on the developing trend.

## Methodology

The analysis is based on a vast amount of studies and data, including research articles, government data, and census data. In the comparison of various green roofs, some aspects will be chosen. For example, roof size, city size, population, building density, and purpose. Applying technologies to green roofs where applicable, the points of interests will be “why it is replaceable?” and “how it can apply to green roof?”.

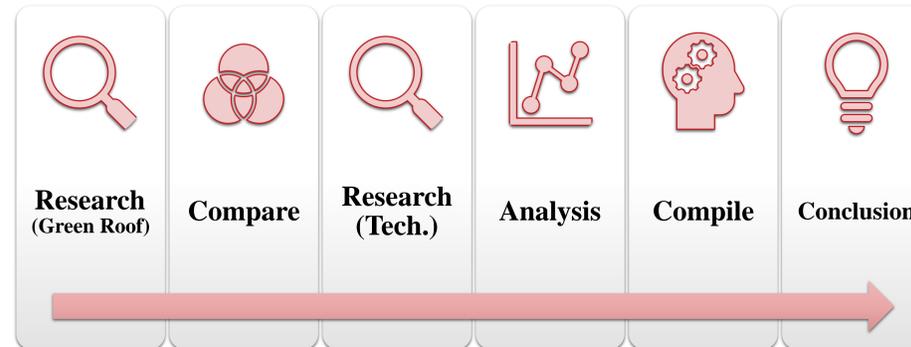


Figure 1. General Procedure

## Findings

### (1) Current Trend of Green Roof Development

#### Objective-based

By studying the green roofs in Fukuoka and New York, it is discovered that they are built to mitigate some environmental problems.

#### Balance Between City Development and Efficiency

Certain green roofs in Tokyo and Frankfurt are divided into multiple small green roofs on several rooftops in a building complex. This strategy helps maximize the area of green roof in a cramped city.

#### Indifference Towards Cost

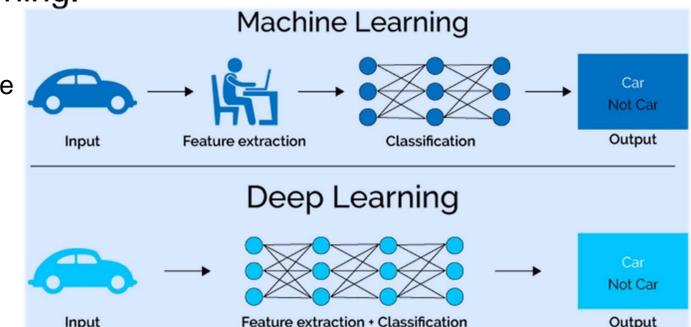
Cost of green roof is only a small portion of the total building cost. Also, the maintenance cost of the green roof is insignificant compared to the total building cost.

### (2) Applicable Technologies

#### Artificial Intelligence (AI)

AI should replace manual labour and the irrigation system should be fully controlled by the AI. With enough data input, AI is able to analyse the situation and perform the best irrigation mode. AI can be programmed to perform basic machine learning or deep learning.

Figure 2. Difference Between machine learning and deep learning



(Source: <http://didarc.com/sites/default/files/users/user7/facedeep-learning-2.jpg>)

#### Cloud Computing

Cloud computing is a platform for conducting weather prediction, saving data and transmitting data. It can be recognised as the central hub of the intelligent green roof maintenance system.

## Conclusion

Implementing cloud computing and artificial intelligence to maintain a green roof is possible. Intelligent green roof maintenance system has high efficiency, but the need for an intelligent green roof maintenance system at current times is uncertain.