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A consistent classification of urban agriculture as prerequisite for a sound sustainability assessment

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Urban agriculture is considered to have considerable potential for the sustainable production of food. However, a closer look reveals a great variability of systems labelled as urban agriculture and a limited availability of data on the sustainability of these systems. To better understand the differences between urban agriculture systems and their sustainability, this work aims at building the ground for establishing a meaningful and holistic classification of different urban agriculture systems and gathering knowledge about their environmental, social and economic sustainability. For this purpose, 93 scientific papers were reviewed. We found different approaches and perspectives for a classification of urban agriculture systems. Some approaches base the classification on the motivation of the systems' operators. These approaches characterize urban agriculture systems based, for example, on their market or production intensity or the motivation to provide social and civic benefits. Other perspectives like the urban planning, architectural or technical perspective characterize urban agriculture systems by the degree of cultivation area conditioning, building integration or technical criteria, respectively. Furthermore, we found that the environmental impacts of urban agricultural production systems reported in different studies varied by up to three orders of magnitude, partly due to the different systems and partly due to different measurement methods. We also found that non-standardized, qualitative methods have predominantly been used to describe the social and economic dimensions of sustainability, so identifying an important research gap for further development.

Keywords: Urban farming, urban food production, environmental impacts, life cycle assessment, literature review, urban gardening

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Visual Harvest: Self-supervised learning for lettuce growth analysis

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Accurately estimating lettuce growth parameters is crucial for optimizing vertical farming systems, yet existing methods often rely on labor-intensive manual measurements or labeled datasets which can be scarce and costly to acquire. In this work, we propose a novel approach that leverages self-supervised learning techniques to estimate lettuce growth parameters (dry weight, fresh weight, height, diameter, and leaf area) using image data collected throughout the plant's growth cycle. Our methodology consists of a two-part pipeline. First, we implement a self-supervised pre-training step using unlabeled lettuce images obtained at different weeks since seeding. The second part involves fine-