Global patent technology portfolio study of agricultural UAV innovations

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Abstract. With the rapid development of technologies, unmanned aerial vehicles (UAVs), commonly called drones, will become affordable with a wide variety of applications. UAV technologies in agriculture are critically important due to climate changes and the continuous growth of global populations that need huge food production. Demand for food and produce is increasing, while agricultural labor forces continue to decline. According to a report presented by The World Bank, the percentage of the global workforce related to agriculture has already fallen from 40% in 2000 to 27% in 2019. To plant efficiently and manage agricultural labor issues, many countries are investing in agricultural UAV technologies and applications. By analyzing the patent portfolio of UAV-related technologies for agricultural applications, this technology mining research helps to discover the critical trends and potentials of agricultural UAV development. This study demonstrates the crucial necessity of transdisciplinary engineering practices that are closely related to precision, automation, and even intelligent agricultural activities and productions. We identify the transdisciplinary domain knowledge ontology schema, i.e., the integrated agriculture, UAV-related technologies and their sub-technologies. These domain patents are searched and found using intelligent patent text analysis techniques. Finally, a strategic agricultural UAV R&D plan is presented to promote precision farming with high efficiencies and profitability (e.g., Taiwan farmers focus on organic farming, quality excellence of produce, and happy agriculture) using innovative UAV technologies.

Keywords. Precision agriculture, advanced agriculture, unmanned aerial vehicle (UAV), transdisciplinary innovations, patent portfolio, technology mining

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