AgroEcoReco

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Key strengths of the project

The AgroEcoReco project addresses a crucial challenge in the agroecological transition by leveraging Machine Learning (ML), particularly Reinforcement Learning (RL), to manage the complexity and uncertainty inherent in agroecological systems. AgroEcoReco demonstrates a good understanding of agro-ecology, and the need for adaptive decision making in agricultural systems, thus requiring the need for reinforcement learning as a method of AI to be applied. The idea of combining Reinforcement learning algorithms with agricultural decision making under uncertainty is nice and well presented. In this way it nicely fits with the call objectives, it is multidisciplinary and well positioned. It demonstrates a good understanding of the field of science in which it operates, both from the perspective of the AI community as from the agriculture community. For example, it nicely explains the lack of data and even more so the problem with FAIR data.
The consortium is multidisciplinary and complementary, integrating a broad spectrum of expertise precisely aligned with the project's objectives, specifically in the domains of IT, AI, agronomy, and agroecology. There is an international axis with the participation of CIRAD.
The project management framework is well structured, with task assignments matched to partners' specific expertise and experience.

Main weaknesses of the project

AgroEcoReco comes with a good ambition and understanding of the problem at hand, however, failing to translate it into a tangible and feasible workplan. While the background, the general context, and the potential benefits are well detailed, AgroEcoReco's methodology is not clear, also due to the size and complexity of the work plan. The committee identifies a big risk of a set of separate activities and PhD/postdoc projects with little integration. The proposed activities do not seem to be well structured to reach the ambition.
It is over-ambitious in what can be achieved from the data, and over-promising on the digital companion and the FAIR data. The nature and amount of data was clarified. However, a substantial amount of data are not available to train robust RL algorithms on this generic scale. And training on mostly data generated by crop models for RL is a way to replace one model with another. This is a major weakness.
Some of the sections are really so generic in their description, like risk and impact.
The consortium lacks representation from social and human sciences, which are essential for addressing the broader socio-cultural and governance aspects of agroecology.
The proposal lacks in a clear dissemination and valorization plan.

Areas for improvement

1. Put the case studies more central in the project. Start from the challenges there, and design appropriate technological solutions, also in the WP structure, building in flexibility to work across case-

studies on RL, but much more targeted on what is actually feasible in each of the case studies, linking to the data available.
2. Clearly and specifically focus the technical/ICT/RL innovations in the workplan on feasible steps that can actually be made. The idea to use RL to emulate farmer decision making is nice, but convincly built this out of the data at hand and the agro-ecological problems to be analysed, specifically linking it to actual farmer decision making.
3. In a way aggregating the data into a FAIR data platform is a good step, and this could build on already existing initiatives, and be a good product in itself, although it also feels like a side product that be could be optional.
4. Tone down the ambitions on the Digital Companion to be generic for all, choose one stakeholder group to focus on across case studies, and do that well. Clearly specify how the digital companion will represent farmer decision making through representing management plans of parcels and all the choices there on farm level.
5. The sections on impact and risk are too generic. Deliver substantial list of risks that clearly link to the projects set up and objectives. Develop impact thinking that goes beyond delivering the product, but thinks through the required stakeholders and steps towards impact.

General assessment

The AgroEcoReco project addresses a challenge in the agroecological transition by leveraging Machine Learning (ML), particularly Reinforcement Learning (RL), to manage the complexity and uncertainty inherent in agroecological systems. It has a good scientific understanding, the right consortium and interesting cases, clearly linked to agro-ecology and with an understanding of AI and the particular challenges of applying reinforcement learning to agro-ecological practices and decision making. However, the current set up has serious problems with its feasibility. The workplan remains too generic, making it difficult to follow in detail how this will be operationalized, and thus lacks specificity to truly evaluate it on its merits. It is over-ambitous, and thus lacks focus and clear timelines. It should be build out of the use cases, linking to specific challenges in farmer decision making and prove how these can be realistically represented in ML/RL models from available data.

This summary is the result of the Committee's collective analysis of the project, taking into account the discussions of the Committee during its meetings.