Using ontologies to create open source smartphone-based differential disease diagnosis and reporting tools for animals in rural settings

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Context

- A successful pilot project in Ethiopia demonstrated the utility of a smartphone app to aid diagnosis of disease in cattle (Fig. 1)
- Lack of access to veterinary services, and mis-diagnosis / incorrect treatment of endemic diseases is a problem across species
- Extending to multiple species, across a number of languages, requires a 'smarter' way of building and supporting mobile apps
- Use of ontologies and the semantic web within an open source platform provides key benefits to m-health app developers
- Existing ontology development for animal health surveillance (AHSO) is underway and shares many features required here

Figure 1. Mis-classification matrix indicating the level of agreement between clinician's diagnosis of cattle disease and that suggested by the smartphone app.

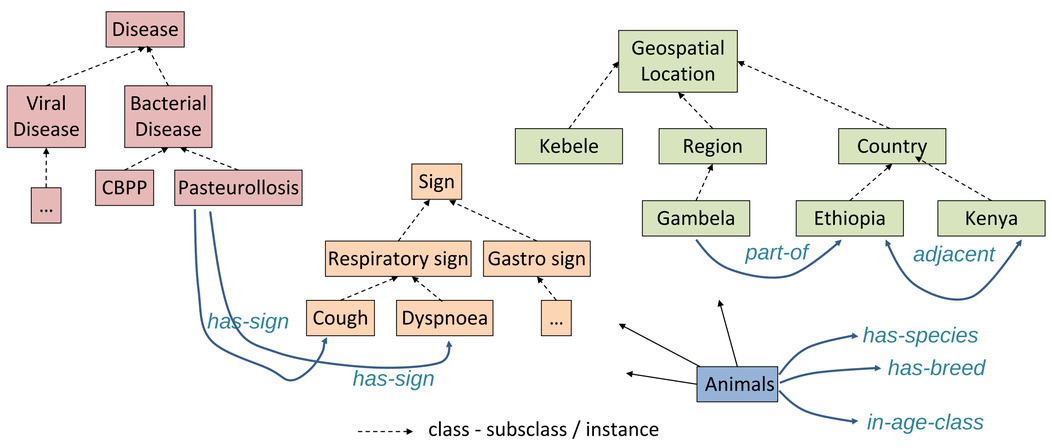


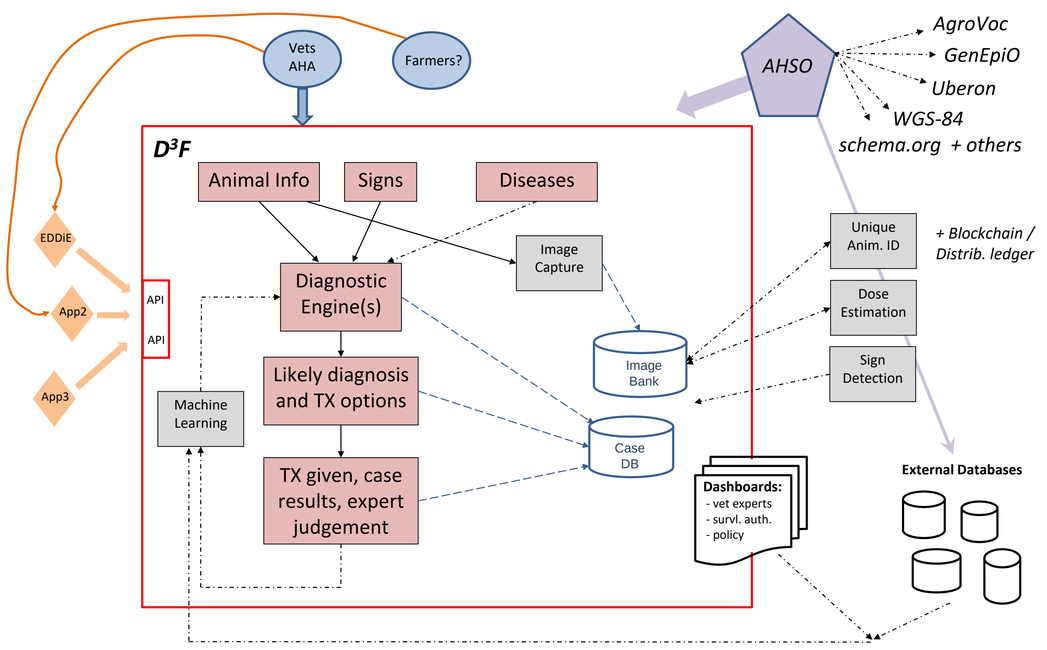
Figure 2. Simplified schematic of a small section of an ontology representing important concepts in the domain of animal disease and diagnosis.

Methods

- Ontologies are "logical and machine interpretable descriptions of a knowledge domain, consisting of the domain's concepts and their relationships" (Fig. 2)
- Here the Animal Health Surveillance Ontology (AHSO) will be used to describe key diseases and symptoms, initially covering 6 species (cattle, camels, sheep, goats, donkeys and horses)
- The ontology will also provide support for 4 natural languages

Architecture

- A Differential Disease Diagnosis Framework (*D³F*) is being created to support app development and manage data
- The AHSO will be used together with other relevant ontologies to provide 'domain agnostic' diagnosis
- APIs will be provided to developers for data handling, diagnostic support and treatment information
- Data-driven learning will improve outcomes over time



Get Involved

- While the next field trials are scheduled to start in Ethiopia this month (Nov'18) once the *D³F* is fully functional it will support developers in any location and provide an open-source, Cloud-based environment to manage disease diagnosis and passive surveillance
- Keep an eye on the Data-Driven Surveillance web site for updates on AHSO and *D³F* (**www.datadrivensurveillance.org**)
- Join us in the quest to put smartphone based diagnostic aids into the hands of less experienced animal health professionals in rural setting and ultimately increase animal productivity through improved diagnosis and treatment

Acknowledgements

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