# A Radiology Ontology for AI Datasets, Models and Projects (ROADMAP)

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## Background/Problem Being Solved

With the explosion of research involving the use of AI, systematic identification of categorization of AI models and datasets to enable discoverability remains a challenge. While many efforts have been established to standardize terminology for methods and datasets used in literature, no structured nomenclature exists to catalog AI models and datasets in the radiology realm to programmatically capture their relevant clinical and technical aspects.

## Intervention(s)

To address the lack of a structured nomenclature to describe radiology AI models and datasets, we developed an ontology to describe key information necessary for both clinicians and engineers to discover, search, and rapidly evaluate these resources.

## Barriers/Challenges

Given the breadth of research in this area and its constantly evolving nature, it was critical to capture information that was generalizable, comprehensive, and standardized to encode model and dataset information.

## Outcome

We created the Radiology Ontology for AI Datasets, Models and Projects (termed ROADMAP) that captures 3,457 classes and 4,541 subclass relationships (Figure 1). In brief, the ontology describes a top-level entity (a “project”) with 0 or more associated models and 0 or more associated datasets. Models are described using a living index of tasks and methods (reconstructed from the PapersWithCode) along with existing radiological ontologies such as RadLex, the RSNA Radiology Playbook, and Radiology Common Data Elements (Table 1). Datasets are described in a comparable manner and contain additional information such as imaging types/sequences, PHI considerations, and patient demographics.

## Conclusion/Statement of Impact/Lessons Learned

ROADMAP can be used to comprehensively describe models and datasets used in AI applications in radiology in a structured, searchable format. Future directions for this work include testing the comprehensiveness of ROADMAP on an extant set of publications and creating an initial set of structured model and dataset cards using the ontology.

# Figure(s)

**Figure 1.** A network visualization of the ontology (partial for visual purposes). Nodes represent elements of the ontology and edges represent relationships between nodes (logical axioms).

| Field Name | Subfields | Description |
|---|---|---|
| Model Details | Model name, model authors, contact information, version number, download link /access instructions | AI models are not static entities and are updated through time as more training data becomes available. Accordingly, there needs to be a versioning method in place to ensure that different versions of each model and contact persons in charge of it are recorded. |
| Uses | Intended use cases, in-scope (and any specific out-of-scope/excluded use cases) | In the realm of AI models in medicine, it is especially important to explicitly state whether models are research-only or can be employed in a clinical setting. This field can be used to do that. |
| Users | Intended users, and excluded users | Like the above field, stating what type of users can use the model is beneficial to describe to outline what cases and by whom the model can be used. |
| Task type | Papers with code task label | At their most basic level, AI models (regardless of whether they are medically oriented or not) aim to achieve standard tasks in the realm of AI. These tasks have been exhaustively documented in the papers with code ontology, so we use that to standardize terminology. |
| Methods | Papers with code method label | Like the above field, many methods in medical AI are also used in regular AI methods, so we employ the papers with code method ontology here as well. |

**Table 1.** Descriptor of some elements and sub-elements of the model portion of the ontology.

# Keywords

Applications; Artificial Intelligence/Machine Learning; Standards & Interoperability