SEMANTIC-DRIVEN VISUALIZED MODEL FOR ECOLOGICAL DATASETS

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Abstract: Large volume of datasets in ecological science requires an understanding of metadata standards and assessment techniques in ecological research findings among diverse research groups. It requires a sharing medium of technical assistance and comprehensive definition of interpretations about the modeling concepts. It can lead to adhoc solutions subjected to growth and change in course of new ecological improvements and methodologies. It urges the need of self-learning initiative to understand the terms with their semantic relationships. These requirements can be mapped to the creation of ontology schema of ecological datasets and visual-information driven models as an initiative. This strategy is clearly explained as follows:

- Collaboration of sharing and usage of datasets for analytical assessments by researchers and information managers make request/response to other research teams by queries and derive in a comprehensive description in their documentations for future references can be mapped in the form of observational metadata standards.
- These observational metadata standards can be stored as observational ontology schema.
- This schema can have technological intelligence of automated entity-relationship model creation for semantic identification and dependencies among the data standards.

In extension to this semantic entity-relationship model (ERD), application of additional visualized models such as Unified Modeling Language (UML) can be used with the transformation of entities to different components constructs. This concept can solve the information entropy problem of platform incompatibility of technological advancements and creates the impact of metadata management. It increases knowledge elicitation and redundancy of analysis and improves data acquisition parameters in ecological research.

Keywords: Entity-Relationship model, Observational ontology, Observational metadata.

Introduction: Ecological research findings play an important role in present era of information and communication environment to make decisions about human being sustainable living with available natural resources and balanced ecosystem. This is possible only with the results and conclusions of various data observations [1] in ecology.

Many ontology [2][6] schemas are present to represent the semantic relationships with constrained metadata. The definition of web ontology language (OWL) and XML based markup language with metadata constructs (Morpho) and Web registries and Ecological Metadata Language (EML) have the presence of high-level contextual information with different style attributes in existing metadata standards. It raises the question, "How much semantic relations and metadata is enough?" with technological advancements and representation constructs.

Challenges of data diversity with technological advancements made a necessity to design structured ecological information system and requires standardized protocols and methods for data documentation standard. It is seen that different environments such as workflow systems [3][5] and statistical evaluation methods need dissimilar annotations in ontology schema and metadata standards. These representations cannot be avoided in assessment of research findings among diverse research groups.

This paper defines a recording of reuse and sharing of methodologies in assessment of different ecological datasets and metadata standards requires documentation in the form of semantic-driven visual data model. This model can be stored as observational ontology schema along with existing schemas. This concept can aid visualization of datasets, monitor the changes in vegetative cover as a researcher can have intense examination on the resources and improve traditional field data approach and reduce the risk of transition speed of long-term observations of vegetation data.

CHALLENGES IN DATASETS AND METADATA

Some of the factors are present as challenges behind these management issues. This includes:

Impact of Metadata and its Management In previous decades, there exist partially addressed issues in ecological information systems without the concept of metadata.

It includes:

- Lack of common data structure for ethnographic field work(interviews, site observations)
- Lack of standard regulation in temporal horizon updates of gradual and immediate changes.
- Lack of common format for data capture and archiving procedures.
- Lack of standard notations for entities and relationships mapping in data pre-processing steps.

These are issues yet to be addressed in metadata management. It includes:

- ***Start-up learning requirement***
- Lack of ***follow-up procedures***
- Lack of ***histories in manipulation***
- Finding ***important decisive points*** in every datasets.

Observational Ontology

Define as a documentation standard:

Site	Date	Plot	Sp	Bm	P	N

Representation in Fields

Species Name	Code
Avenafatua	AVFAT
Bromushordeaceus	BRHOR
Calochortuslutens	CALUT

User-defined Codes

Table 1.Different Schemes in Metadata Representation

Citation:Fegraus, Eric H., et al [1]

These hypothetical statements [4] remain true with observational datasets requirements in existing metadata requirements. It follows as:

H1: Data acquisition doesn't require significant additional instruction and that would stand on its own.

H2: Logical Relationships are explicitly managed in the system as metadata standards.

H3: Presence of contextual metadata representation with respect to data and services is easy for users (e.g., those who are trying to find new and relevant datasets and services).

H4: Support for syntactic metadata with different granularities.

ENTITY-RELATIONSHIP MODEL(FLOW-BASED): Entity can be in different metadata representations of current dataset and relationship can be described as task activity name in the workflow or in assessment procedure. Concepts like dependencies, integrity constraints, referential constraints can be applied in the model thereby it indirectly makes the information manager or scientist to know the basic semantic relations. Generalisation, aggregation concepts used in the entity-relationship diagram makes the information managers to predict the decisive points and ensure automate learning [7][8].

Representation This entity-relationship concept can widely used in plant ontology schemas where floral diversity and species classification have complex relationships and annotations (Fig 3). Researchers use the dataset for traits analysis, structural decompositions using mathematical distributions. Some of the traits of vegetation community isused as a dataset for representation of a entity-representation model.

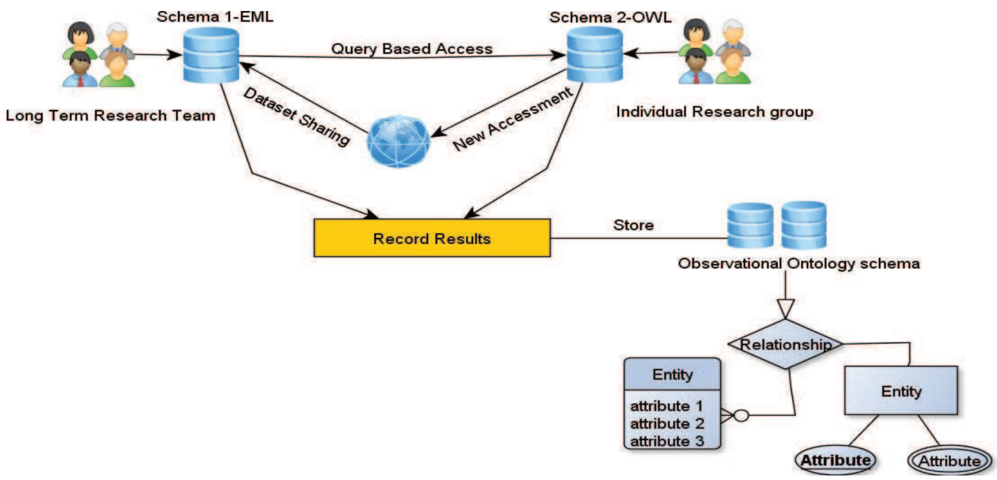

Fig 3.Functional Diagram of Semantic-Driven Visual Model

This structural representation can be taken as snapshots periodically along with log information to get update in existing ontology schemes and dataset specifications. Frequent accessibility of metadata schemes can make rapid ERD diagrams can make unreliable decision to commit the final snapshot. To address this problem, information manager can take last update snapshot in the final session of interaction as a final committed structure.

Implementation of this ERD concept (Fig 4) as a tool can provide help menu or hints to the users to easily understand the logic behind these metadata codes and basic semantics. The developer of ERD model must aware of taking intermediate snapshots other than final structure in a separate storage for the future recovery in the case of system failure and natural calamities etc. used for ensuring concurrency of the observations, if final snapshot is not available .

Advantage: This entity-relationship model won't take more amount of time to understand because their natures of symbols are similar to the flowchart diagrams. Every information manager can start this type of presentation along with available documentation standard and improvise with additional features in future can solve the information entropy problem in ecological research findings.

Conclusion: These recordings of observations in ontology schema along with the data model reduce the work effort of research groups to self-examine the behaviour of the datasets with more semantic relationships. Designing the data model can be automated and use as a visual-documentation standard throughout new findings.

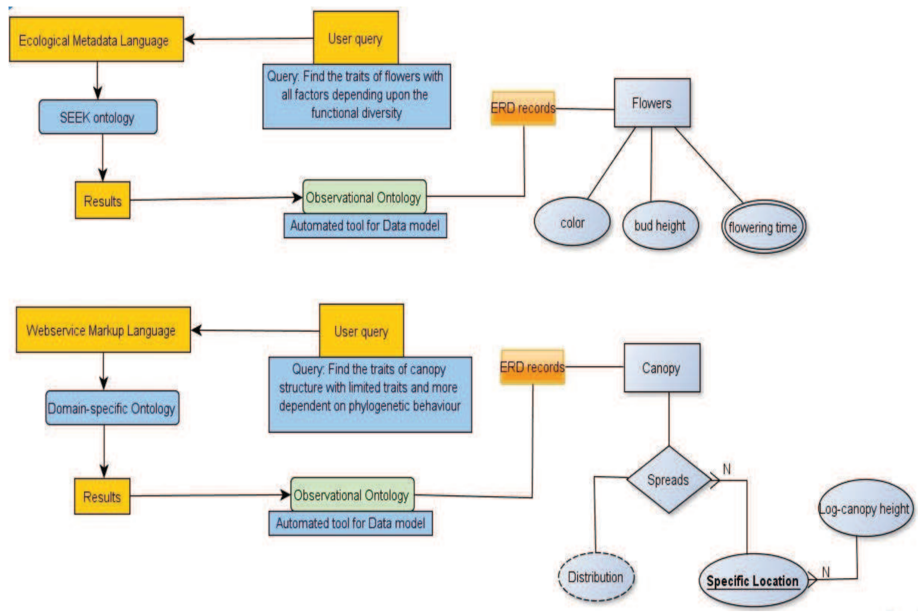

Fig 4.Representation of ERD model in Observational Ontology Schema

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