Modular Ontology Evaluation Report

Ontology IRI: http://www.owl-ontologies.com/AnimalBehavior/
Date: January 23, 2024

1 Evaluation Matrics

1.1 Naming Convention

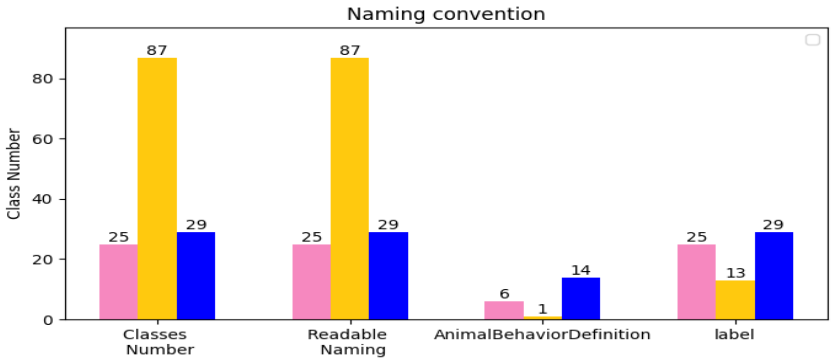

Figure 1: Classes Naming Convention Histogram

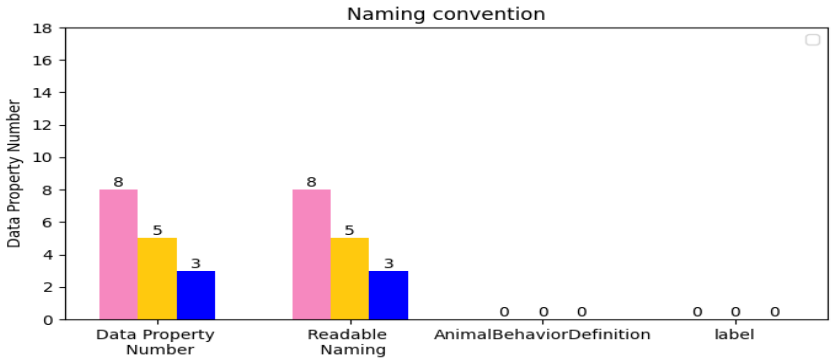

Figure 2: Data Properties Naming Convention Histogram

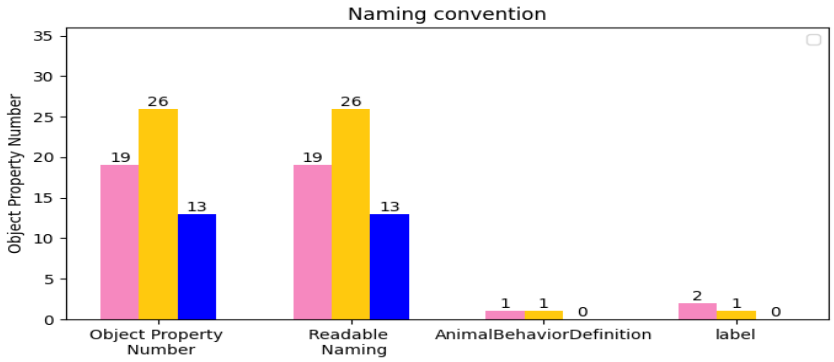

Figure 3: Object Properties Naming Convention Histogram

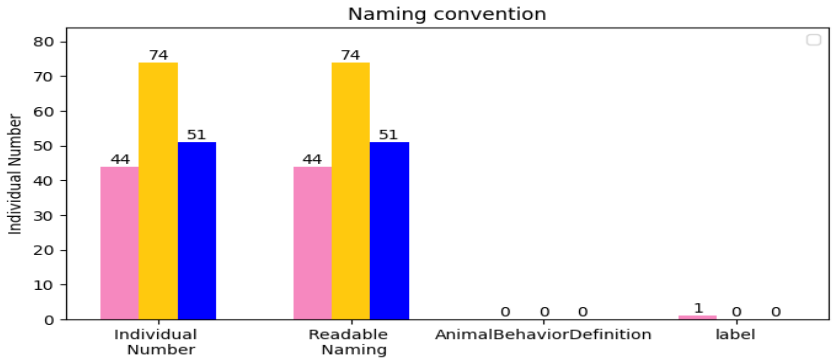

Figure 4: Individuals Naming Convention Histogram

1.2 Syntax Evaluation

Module	Lawfulness	Richness	Syntactic Quality
Herd	0.402	0.185	0.294
Pasture	0.528	0.185	0.357
Behavior	0.479	0.185	0.332

Table 1: Modules Syntax Evaluation Results

1.3 Categorization & Distribution Evaluation

Module	Class Distribution	Attribute Distribution	Relationship Distribution	Module Distribution
Herd	0.095	0.030	0.072	0.197
Pasture	0.217	0.012	0.065	0.294
Behavior	0.111	0.011	0.050	0.172

Table 2: Modules Categorization & Distribution Evaluation Results

1.4 Structure Evaluation

Module	Size of Module	Appropriate-ness	Relative Size	Depth of Module	Average Depth of inheritance Tree
Herd	264	0.943	0.282	1.000	1.000
Pasture	401	1.000	0.428	1.000	1.000
Behav-ior	262	0.938	0.280	1.000	1.000

Module	Atomic Size	Module Density	Breadth of Module	Overall Comlexity of Module
Herd	1.576	106.675	25	40.346
Pasture	1.645	138.512	87	38.071
Behavior	1.680	105.960	29	40.130

Table 3: Modules Structure Evaluation Results

1.5 Richness Evaluation

Module	Attribute Richness	Inheritance Richness	Relationship Richness
Herd	0.320	0.480	0.613
Pasture	0.057	0.828	0.265
Behavior	0.103	0.724	0.382

Table 4: Modules Richness Evaluation Results

1.6 Logical Criteria Evaluation

Module	Correctness of Module	Completeness of Module
Herd	True	True
Pasture	True	True
Behavior	True	True

Table 5: Modules Logical Criteria Evaluation Results

1.7 Relatedness Evaluation

Module	Inter-Module Distance	Intra-Module Distance	Relative Intra-Module Distance
Herd	2	8.009	0.772
Pasture	1	9.651	2.413
Behavior	2	7.821	0.584

Module	Encapsulation	Redundancy	Independency
Herd	32	0	94.150
Pasture	2	0	99.637
Behavior	30	0	93.506

Table 6: Modules Relatedness Evaluation Results

1.8 Quality Evaluation

Module	Precision	Recall	Module Cohesion	Module Coupling	Module Overall Quality
Herd	1.000	0.177	1.576	(25,522)	79.200
Pasture	1.000	0.617	1.645	(87,464)	120.300
Behavior	1.000	0.206	1.680	(29,433)	78.600

Table 7: Modules Quality Evaluation Results

2 Use cases tested

Use case N 1:

Input

Individuals	Features
Herd02	• GrasingInPasture $\Longrightarrow$ Pasture02 • hasPerMovement $\Longrightarrow$ 29.3 • hasPerIngestion $\Longrightarrow$ 46.7 • hasNbrTotalAnimal $\Longrightarrow$ 7 • hasAnimal $\Longrightarrow$ G1 • hasAnimal $\Longrightarrow$ G2 • hasAnimal $\Longrightarrow$ G3 • hasAnimal $\Longrightarrow$ G4 • hasAnimal $\Longrightarrow$ G5 • hasAnimal $\Longrightarrow$ G6 • hasAnimal $\Longrightarrow$ G7
Pasture02	• hasHerd $\Longrightarrow$ Herd02 • hasARR $\Longrightarrow$ Pasture02ARR • hasSeason $\Longrightarrow$ Spring
Pasture02ARR	• hasValue $\Longrightarrow$ 70

MovementG1	• hasMovementTail $\Longrightarrow$ Lowered • hasMovementTail $\Longrightarrow$ Waggin
MovementG7	• hasMovementTail $\Longrightarrow$ Lowered • hasMovementTail $\Longrightarrow$ Straight
G1	• isOneOfHerd $\Longrightarrow$ Herd02 • hasMovement $\Longrightarrow$ MovementG1
G2	• isOneOfHerd $\Longrightarrow$ Herd02
G3	• isOneOfHerd $\Longrightarrow$ Herd02
G4	• isOneOfHerd $\Longrightarrow$ Herd02
G5	• isOneOfHerd $\Longrightarrow$ Herd02
G6	• isOneOfHerd $\Longrightarrow$ Herd02
G7	• isOneOfHerd $\Longrightarrow$ Herd02 • hasMovement $\Longrightarrow$ MovementG7

Output

Individuals	**New** features
Herd02	• IndicateToPastureState $\Longrightarrow$ ModeratelyRich • IndicateToAnimalState $\Longrightarrow$ ModeratelySatisfied • hasEffectOnPasture $\Longrightarrow$ NormalUse
Pasture02	
Pasture02ARR	
MovementG1	
MovementG7	
G1	• StateOneAnimal $\Longrightarrow$ Relaxation • StateOneAnimal $\Longrightarrow$ Contentment • StateOneAnimal $\Longrightarrow$ Happy
G2	
G3	
G4	
G5	
G6	
G7	• StateOneAnimal $\Longrightarrow$ Contentment • StateOneAnimal $\Longrightarrow$ Interest