Modular Ontology Evaluation Report

Ontology IRI: http://www.owl-ontologies.com/AnimalBehavior/
Date: April 25, 2024

1 Evaluation Matrics

1.1 Naming Convention

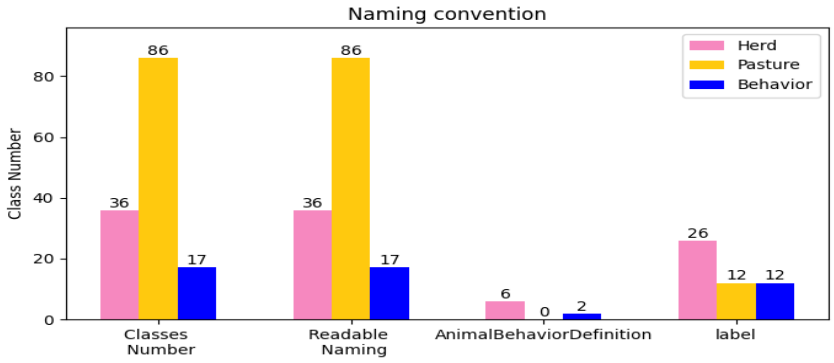

Figure 1: Classes Naming Convention Histogram

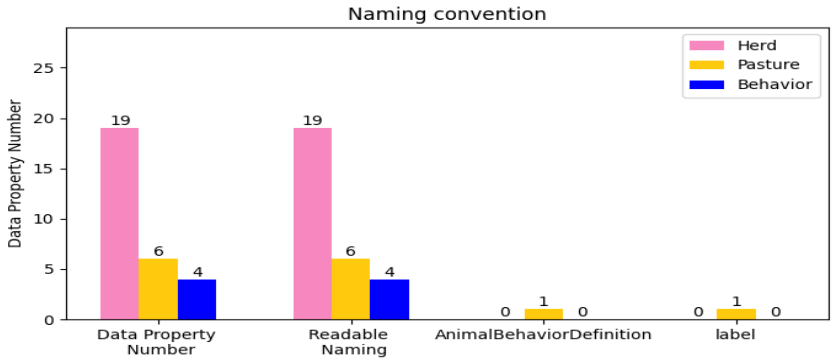

Figure 2: Data Properties Naming Convention Histogram

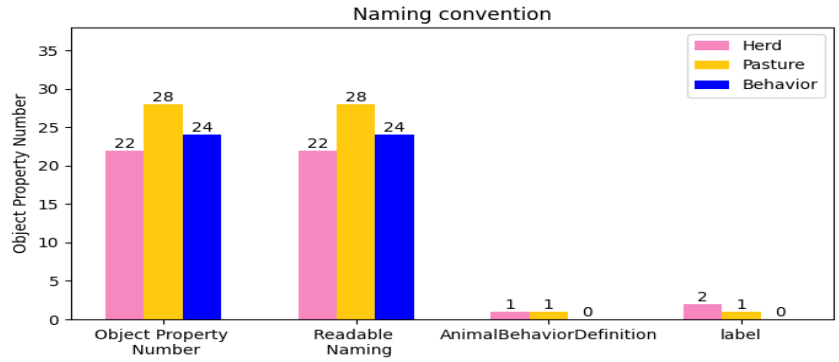

Figure 3: Object Properties Naming Convention Histogram

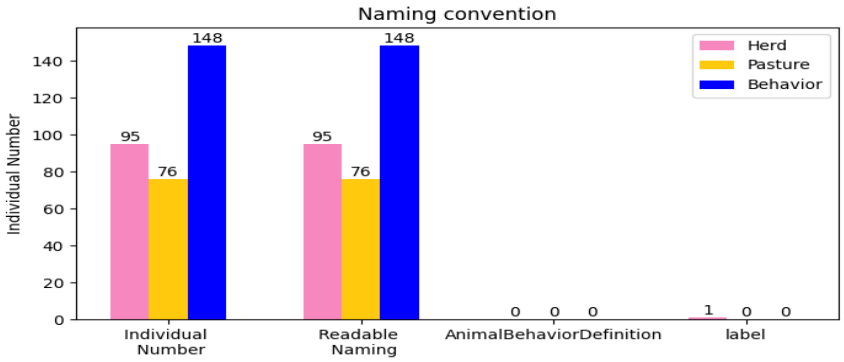

Figure 4: Individuals Naming Convention Histogram

1.2 Syntax Evaluation

Module	Lawfulness	Richness	Syntactic Quality
Herd	0.277	0.185	0.231
Pasture	0.447	0.185	0.316
Behavior	0.114	0.185	0.150

Table 1: Modules Syntax Evaluation Results

1.3 Categorization & Distribution Evaluation

Module	Class Distribution	Attribute Distribution	Relationship Distribution	Module Distribution
Herd	0.110	0.058	0.067	0.235
Pasture	0.210	0.015	0.068	0.293
Behavior	0.096	0.022	0.135	0.253

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	328	1.000	0.350	1.000	1.000
Pasture	409	1.000	0.437	1.000	1.000
Behav-ior	178	0.610	0.190	1.000	1.000

Module	Atomic Size	Module Density	Breadth of Module	Overall Comlexity of Module
Herd	1.483	123.792	36	41.505
Pasture	1.716	141.314	86	38.858
Behavior	2.172	92.700	17	47.763

Table 3: Modules Structure Evaluation Results

1.5 Richness Evaluation

Module	Attribute Richness	Inheritance Richness	Relationship Richness
Herd	0.528	0.417	0.595
Pasture	0.070	0.837	0.280
Behavior	0.235	0.647	0.686

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	3	5.390	3.827
Pasture	3	8.783	0.434
Behavior	3	7.090	2.127

Module	Encapsulation	Redundancy	Independency
Herd	199	0	87.086
Pasture	8	0	99.196
Behavior	150	0	86.535

Table 6: Modules Relatedness Evaluation Results

1.8 Quality Evaluation

Module	Precision	Recall	Module Cohesion	Module Coupling	Module Overall Quality
Herd	1.000	0.252	1.483	(36,1486)	98.400
Pasture	1.000	0.601	1.716	(86,909)	122.700
Behavior	1.000	0.119	2.172	(17,1097)	53.400

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