

USC Ground Truth Documentation

September 5, 2018

Contents

1 Background

We use influence diagrams as the underlying graph structure for our ground truth. Here is a simple influence diagram for a simulation of two actors, showing the three types of nodes and some possible links (always directed) among them:

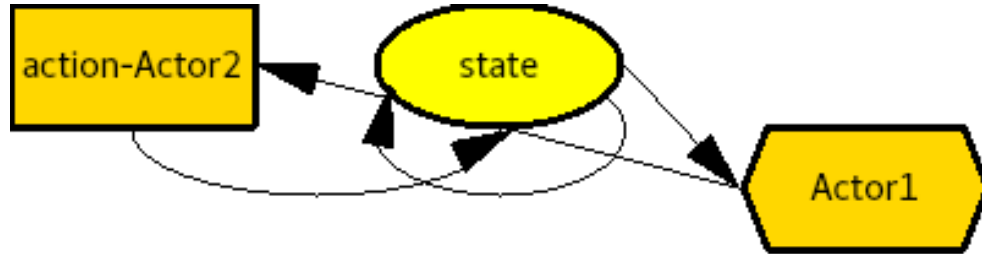


Figure 1: Simple influence diagram

- Rectangular nodes are possible actions for a particular agent (“Actor 1”, indicated by color) representing a potential behavior. They are labeled with a verb (“action”) and an optional object of the verb (“Actor2”). An action node has a binary value, indicating whether or not the action was chosen.
- Oval nodes are state variables. Their value is potentially a probability distribution over a domain of possible values. All true state variables will be certain (i.e., 100% probability for a single value), but agents’ perceptions of the true state will often be uncertain.
- Hexagonal nodes are utility or reward nodes. They represent an expected value computation by the agent (“Actor1”). The node’s value is a table with each row corresponding to a possible action choice and its expected utility.
- Links from action nodes to state nodes specify an effect that the action has on the value of the state.
- Links from one state node to another specify an influence that the value of the first state node has on the effect of at least one action on the second state node.
- Links from a state node to an agent’s utility node specify that the state node is an input to the expected value calculation performed by that agent. There is a real-valued weight from $(0,1]$ on each link specifying the priority of that variable’s influence on that agent’s reward calculation (higher values mean higher priority).
- Links from utility nodes to action nodes indicate that the expected value calculation then determines whether or not that action is chosen. In the simulations described here, we use a strict maximization, so that the action choice is deterministic (i.e., the action with the highest expected value is performed, with ties broken by a pre-determined fixed order).
- Therefore, in the above simple ground truth, whether or not “Actor1” chooses to do “action” to “Actor2” influences the subsequent value of the variable “state” (link from rectangle to oval). The subsequent value of “state” also depends on its prior value (link from oval to itself). “Actor1”’s expected value of doing “action” to “Actor2” is a function of the value of “state” (link from oval to hexagon), and this expected value influences whether or not “Actor1” chooses to do so (link from hexagon to rectangle).

Any real values (e.g., initial values of variables, conditional probability table values, reward weights) will be drawn from either a set $\{0, 0.5, 1\}$ or $\{0, 0.2, 0.4, 0.6, 0.8, 1\}$, depending on the appropriate granularity needed.

2 State

2.1 Actor's age

Type: Integer

2.2 Actor's alive

Type: Boolean

2.2.1 Default change in Actor's alive

IF Actor's alive

THEN IF Actor's health' > 0.01

THEN Actor's alive' \leftarrow true

ELSE Actor's alive' \leftarrow false

ELSE Actor's alive' \leftarrow Actor's alive

2.3 Actor's attachment

Attachment style

Type: String

Values: anxious, avoidant, secure

2.4 Actor's attribution

Causal attribution style, whether attributing events to internal or external causes

Type: String

Values: external, internal, none

2.5 Actor's category

Type: Integer

2.6 Actor's categoryData

Type: Integer

2.7 Actor's center

Type: String

Values: Region01, none

2.8 Actor's children

Number of children

Type: Real

2.9 Actor's childrenHealth

Current level of children's physical wellbeing

Type: Real

2.9.1 Default change in Actor's childrenHealth

IF Actor's alive

THEN IF Actor's risk' > [0.2,0.4,0.6,0.8,1.0]

Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

1

20%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth

80%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

2

40%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth

60%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

3

60%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth

40%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

4

80%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth

19%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

5

100%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth

0%: Actor's childrenHealth' \leftarrow 60%·Actor's childrenHealth+0.24

ELSE Actor's childrenHealth' \leftarrow 0.00

2.10 Actor's control

Control style, whether low or high self-efficacy

Type: String

Values: hiEfficacy, loEfficacy, none

2.11 Actor's coping

Coping style, whether biased toward emotion- or problem-directed decision-making

Type: String

Values: emotion, none, problem

2.12 Actor's days

Type: Integer

2.13 Actor's employed

Has a full-time job

Type: Boolean

2.13.1 Effect of Actor-evacuate on Actor's employed

Actor's employed' \leftarrow Actor's employed

2.14 Actor's ethnicGroup

Ethnicity of actor

Type: String

Values: majority, minority

2.15 Actor's gender

Type: String

Values: female, male

2.16 Actor's grievance

Current level of grievance felt toward system

Type: Real

2.16.1 Effect of System-allocate-Region01 on Actor's grievance

IF Actor's region=Region01

THEN Actor's grievance' $\leftarrow 80\% \cdot \text{Actor's grievance}$

ELSE Actor's grievance' $\leftarrow 80\% \cdot \text{Actor's grievance} + 0.20$

2.17 Actor's health

Current level of physical wellbeing

Type: Real

2.17.1 Default change in Actor's health

IF Actor's alive

THEN IF Actor's risk' $> [0.2, 0.4, 0.6, 0.8, 1.0]$

Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

1

20%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health}$

80%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

2

40%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health}$

60%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

3

60%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health}$

40%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

4

80%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health}$

19%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

5

100%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health}$

0%: Actor's health' $\leftarrow 60\% \cdot \text{Actor's health} + 0.24$

ELSE Actor's health' $\leftarrow 0.00$

2.18 Actor's location

Current location

Type: String

Values: Region01, evacuated, shelter1

2.18.1 Effect of Actor-evacuate on Actor's location

Actor's location' $\leftarrow \text{evacuated}$

2.18.2 Effect of Actor-moveTo-Region01 on Actor's location

Actor's location' \leftarrow Region01

2.18.3 Effect of Actor-moveTo-shelter1 on Actor's location

Actor's location' \leftarrow shelter1

2.19 Actor's perceivedChildrenHealth

Type: Real

2.20 Actor's perceivedHealth

Type: Real

2.21 Actor's pet

Owns a pet

Type: Boolean

2.21.1 Effect of Actor-moveTo-shelter1 on Actor's pet

```
IF Actor's location' = shelter1
  THEN IF Region01's shelterPets
    THEN Actor's pet'  $\leftarrow$  Actor's pet
    ELSE Actor's pet'  $\leftarrow$  false
  ELSE Actor's pet'  $\leftarrow$  Actor's pet
```

2.22 Actor's phase

Type: String

Values: active, approaching, none

2.23 Actor's rcvdCategoryMsg

Type: Integer

2.24 Actor's region

Region of residence

Type: String

Values: Region01

2.25 Actor's religion

Religious affiliation of actor

Type: String

Values: majority, minority, none

2.26 Actor's resources

Material resources (wealth) currently owned

Type: Real

2.26.1 Effect of Actor-evacuate on Actor's resources

```
IF Actor's resources > 0.20
  THEN Actor's resources' ← Actor's resources - 0.20
  ELSE Actor's resources' ← 0.00
```

2.26.2 Effect of Actor-moveTo-Region01 on Actor's resources

```
IF Actor's alive
  THEN IF Actor's employed
    THEN Actor's resources' ← 80% · Actor's resources + 0.20
    ELSE Actor's resources' ← 80% · Actor's resources
  ELSE Actor's resources' ← Actor's resources
```

2.26.3 Effect of Actor-stayInLocation on Actor's resources

```
IF Actor's alive
  THEN IF Actor's employed
    THEN IF Actor's location = {'Region01', 'evacuated'}
      THEN Actor's resources' ← 80% · Actor's resources + 0.20
      ELSE Actor's resources' ← Actor's resources
    ELSE Actor's resources' ← 80% · Actor's resources
  ELSE Actor's resources' ← Actor's resources
```

2.26.4 Effect of Actor-takeResources-Region01 on Actor's resources

$\text{Actor's resources}' \leftarrow 80\% \cdot \text{Actor's resources} + 0.20$

2.27 Actor's risk

Current level of risk from hurricane

Type: Real

2.27.1 Effect of Actor-decreaseRisk-Region01 on Actor's risk

$\text{Actor's risk}' \leftarrow 80\% \cdot \text{Actor's risk} + 0.20$

2.27.2 Effect of Actor-takeResources-Region01 on Actor's risk

```
IF Nature's phase = none
  THEN Actor's risk' ← 19% · Actor's risk + 0.80
  ELSE Actor's risk' ← 80% · Actor's risk + 0.20
```

2.27.3 Default change in Actor's risk

```
IF Actor's alive
  THEN IF Actor's location' = shelter1
    THEN Actor's risk' ← Region01's shelterRisk
  ELSE IF Actor's location' = evacuated
    THEN Actor's risk' ← 9% · Actor's risk
```


ELSE Actor's risk' \leftarrow Region01's risk
 ELSE Actor's risk' \leftarrow 0.00

2.28 Actor's x

Representation of residence's longitude

Type: Real

2.29 Actor's y

Representation of residence's latitude

Type: Real

2.30 Group's size

Type: Integer

2.30.1 Effect of Actor-join-Group on Group's size

Group's size' \leftarrow Group's size + 1

2.30.2 Effect of Actor-leave-Group on Group's size

Group's size' \leftarrow Group's size - 1

2.31 Nature's category

Type: Integer

2.31.1 Effect of Nature-evolve on Nature's category

IF Nature's phase' = none or approaching or active

IF Nature's category = 0

THEN

20%: Nature's category' \leftarrow 1

20%: Nature's category' \leftarrow 2

20%: Nature's category' \leftarrow 3

20%: Nature's category' \leftarrow 4

20%: Nature's category' \leftarrow 5

ELSE IF Nature's category = 1

THEN

80%: Nature's category' \leftarrow Nature's category

20%: Nature's category' \leftarrow 2

ELSE IF Nature's category = 5

THEN

20%: Nature's category' \leftarrow 4

80%: Nature's category' \leftarrow Nature's category

ELSE

10%: Nature's category' \leftarrow Nature's category - 1

80%: Nature's category' \leftarrow Nature's category

10%: Nature's category' \leftarrow Nature's category + 1

1 Nature's category' \leftarrow Nature's category

2 Nature's category' \leftarrow 0

2.32 Nature's days

Type: Integer

2.32.1 Effect of Nature-evolve on Nature's days

```
IF Nature's phase=Nature's phase'  
    THEN Nature's days'←Nature's days+1  
    ELSE Nature's days'←0
```

2.33 Nature's location

Type: String

Values: Region01, none

2.33.1 Effect of Nature-evolve on Nature's location

```
IF Nature's phase'=noneor approachingor active  
    IF Nature's location=none  
        THEN Nature's location'←Region01  
        ELSE Nature's location'←Nature's location  
    1 IF Nature's location=Region01  
        Nature's location'←Nature's location  
  
        20%: Nature's location'←Region01  
        40%: Nature's location'←none  
    2 Nature's location'←none
```

2.34 Nature's phase

Type: String

Values: active, approaching, none

2.34.1 Effect of Nature-evolve on Nature's phase

```
IF Nature's phase=noneor approaching  
    IF Nature's days>5  
        THEN  
            40%: Nature's phase'←approaching  
            60%: Nature's phase'←none  
        ELSE Nature's phase'←none  
    1 IF Nature's days>5  
        THEN  
            40%: Nature's phase'←active  
            60%: Nature's phase'←approaching  
        ELSE Nature's phase'←approaching  
    IF Nature's location=none  
        THEN Nature's phase'←none  
        ELSE Nature's phase'←active
```

2.35 Region01's economy

Current economic level of region

Type: Real

2.36 Region01's risk

Level of risk from hurricane

Type: Real

2.36.1 Effect of Actor-decreaseRisk-Region01 on Region01's risk

$\text{Region01's risk}' \leftarrow 80\% \cdot \text{Region01's risk}$

2.36.2 Effect of Nature-evolve on Region01's risk

IF Nature's phase' = active

THEN IF Nature's location' = Region01

Region01's risk' $\leftarrow 80\% \cdot \text{Region01's risk}$

IF Nature's category = [1,2,3,4,5]

Region01's risk' $\leftarrow 90\% \cdot \text{Region01's risk} + 0.10$

1 Region01's risk' $\leftarrow 80\% \cdot \text{Region01's risk} + 0.20$

2 Region01's risk' $\leftarrow 70\% \cdot \text{Region01's risk} + 0.30$

3 Region01's risk' $\leftarrow 60\% \cdot \text{Region01's risk} + 0.40$

4 Region01's risk' $\leftarrow 50\% \cdot \text{Region01's risk} + 0.50$

ELSE Region01's risk' $\leftarrow 80\% \cdot \text{Region01's risk}$

2.36.3 Effect of System-allocate-Region01 on Region01's risk

$\text{Region01's risk}' \leftarrow 90\% \cdot \text{Region01's risk}$

2.37 Region01's security

Level of law enforcement in region

Type: Real

2.38 Region01's shelterPets

Type: Boolean

2.39 Region01's shelterRisk

Type: Real

2.39.1 Effect of Nature-evolve on Region01's shelterRisk

IF Nature's phase' = active

THEN IF Nature's location' = Region01

THEN IF Nature's category = [1,2,3,4,5]

Region01's shelterRisk' $\leftarrow \text{Region01's shelterRisk}$

1 Region01's shelterRisk' $\leftarrow 80\% \cdot \text{Region01's shelterRisk} + 0.20$

2 Region01's shelterRisk' $\leftarrow 60\% \cdot \text{Region01's shelterRisk} + 0.40$

3 Region01's shelterRisk' $\leftarrow 39\% \cdot \text{Region01's shelterRisk} + 0.60$

4 Region01's shelterRisk' $\leftarrow 19\% \cdot \text{Region01's shelterRisk} + 0.80$

ELSE Region01's shelterRisk' $\leftarrow \text{Region01's shelterRisk}$

ELSE Region01's shelterRisk' $\leftarrow 80\% \cdot \text{Region01's shelterRisk}$

2.40 System's resources

Type: Integer

2.40.1 Effect of System-allocate-Region01 on System's resources

System's resources' \leftarrow System's resources -5

2.41 day

Type: Integer

2.41.1 Effect of Nature-evolve on day

day' \leftarrow day + 1

3 Relations

3.1 Actor friendOf Actor

Type: Boolean

3.2 Actor memberOf Group

Type: Boolean

3.2.1 Effect of Actor-join-Group on Actor memberOf Group

Actor memberOf Group' \leftarrow true

3.2.2 Effect of Actor-leave-Group on Actor memberOf Group

Actor memberOf Group' \leftarrow false

4 Actions

4.1 Nature evolve

4.1.1 Effect on Nature's category of Nature evolve

IF Nature's phase' = none or approaching or active

IF Nature's category = 0

THEN

20%: Nature's category' \leftarrow 1

20%: Nature's category' \leftarrow 2

20%: Nature's category' \leftarrow 3

20%: Nature's category' \leftarrow 4

20%: Nature's category' \leftarrow 5

ELSE IF Nature's category = 1

THEN

80%: Nature's category' \leftarrow Nature's category

20%: Nature's category' \leftarrow 2

ELSE IF Nature's category = 5

THEN

20%: Nature's category' \leftarrow 4

80%: Nature's category' \leftarrow Nature's category

ELSE

10%: Nature's category' \leftarrow Nature's category -1

80%: Nature's category' \leftarrow Nature's category

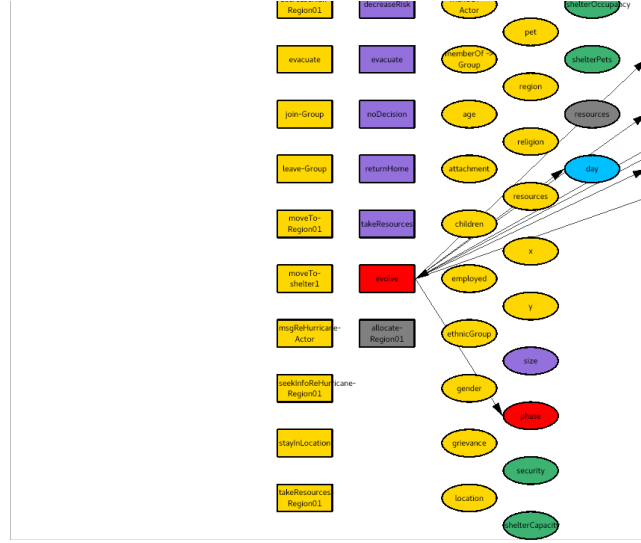


Figure 2: Ground Truth subgraph for Nature-evolve

10%: $\text{Nature's category}' \leftarrow \text{Nature's category} + 1$
 1 $\text{Nature's category}' \leftarrow \text{Nature's category}$
 2 $\text{Nature's category}' \leftarrow 0$

4.1.2 Effect on Nature's days of Nature evolve

IF $\text{Nature's phase} = \text{Nature's phase}'$
 THEN $\text{Nature's days}' \leftarrow \text{Nature's days} + 1$
 ELSE $\text{Nature's days}' \leftarrow 0$

4.1.3 Effect on Nature's location of Nature evolve

IF $\text{Nature's phase}' = \text{none}$ or approaching or active
 IF $\text{Nature's location} = \text{none}$
 THEN $\text{Nature's location}' \leftarrow \text{Region01}$
 ELSE $\text{Nature's location}' \leftarrow \text{Nature's location}$
 1 IF $\text{Nature's location} = \text{Region01}$
 $\text{Nature's location}' \leftarrow \text{Nature's location}$

20%: $\text{Nature's location}' \leftarrow \text{Region01}$
 40%: $\text{Nature's location}' \leftarrow \text{none}$
 2 $\text{Nature's location}' \leftarrow \text{none}$

4.1.4 Effect on Nature's phase of Nature evolve

IF Nature's phase=none or approaching

IF Nature's days>5

THEN

40%: Nature's phase' \leftarrow approaching

60%: Nature's phase' \leftarrow none

ELSE Nature's phase' \leftarrow none

1 IF Nature's days>5

THEN

40%: Nature's phase' \leftarrow active

60%: Nature's phase' \leftarrow approaching

ELSE Nature's phase' \leftarrow approaching

IF Nature's location=none

THEN Nature's phase' \leftarrow none

ELSE Nature's phase' \leftarrow active

4.1.5 Effect on Region01's risk of Nature evolve

IF Nature's phase'=active

THEN IF Nature's location'=Region01

Region01's risk' \leftarrow 80%·Region01's risk

IF Nature's category=[1,2,3,4,5]

Region01's risk' \leftarrow 90%·Region01's risk+0.10

1 Region01's risk' \leftarrow 80%·Region01's risk+0.20

2 Region01's risk' \leftarrow 70%·Region01's risk+0.30

3 Region01's risk' \leftarrow 60%·Region01's risk+0.40

4 Region01's risk' \leftarrow 50%·Region01's risk+0.50

ELSE Region01's risk' \leftarrow 80%·Region01's risk

4.1.6 Effect on Region01's shelterRisk of Nature evolve

IF Nature's phase'=active

THEN IF Nature's location'=Region01

THEN IF Nature's category=[1,2,3,4,5]

Region01's shelterRisk' \leftarrow Region01's shelterRisk

1 Region01's shelterRisk' \leftarrow 80%·Region01's shelterRisk+0.20

2 Region01's shelterRisk' \leftarrow 60%·Region01's shelterRisk+0.40

3 Region01's shelterRisk' \leftarrow 39%·Region01's shelterRisk+0.60

4 Region01's shelterRisk' \leftarrow 19%·Region01's shelterRisk+0.80

ELSE Region01's shelterRisk' \leftarrow Region01's shelterRisk

ELSE Region01's shelterRisk' \leftarrow 80%·Region01's shelterRisk

4.1.7 Effect on day of Nature evolve

day' \leftarrow day+1

4.2 Actor decreaseRisk Region01

4.2.1 Applicability of Actor decreaseRisk Region01

IF Actor's location=Region01

THEN IF Actor's alive

THEN true

ELSE false

ELSE false

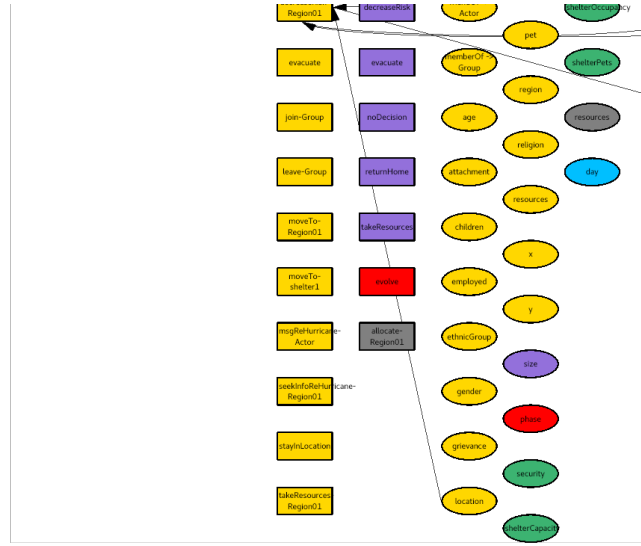


Figure 3: Ground Truth subgraph for Actor-decreaseRisk-Region01

4.2.2 Effect on Actor's risk of Actor decreaseRisk Region01

$\text{Actor's risk}' \leftarrow 80\% \cdot \text{Actor's risk} + 0.20$

4.2.3 Effect on Region01's risk of Actor decreaseRisk Region01

$\text{Region01's risk}' \leftarrow 80\% \cdot \text{Region01's risk}$

4.3 Actor evacuate

4.3.1 Applicability of Actor evacuate

```

IF Nature's phase=none
  THEN false
  ELSE IF Actor's location=evacuated
    THEN false
    ELSE IF Actor's alive
      THEN true
      ELSE false

```

4.3.2 Effect on Actor's employed of Actor evacuate

$\text{Actor's employed}' \leftarrow \text{Actor's employed}$

4.3.3 Effect on Actor's location of Actor evacuate

$\text{Actor's location}' \leftarrow \text{evacuated}$

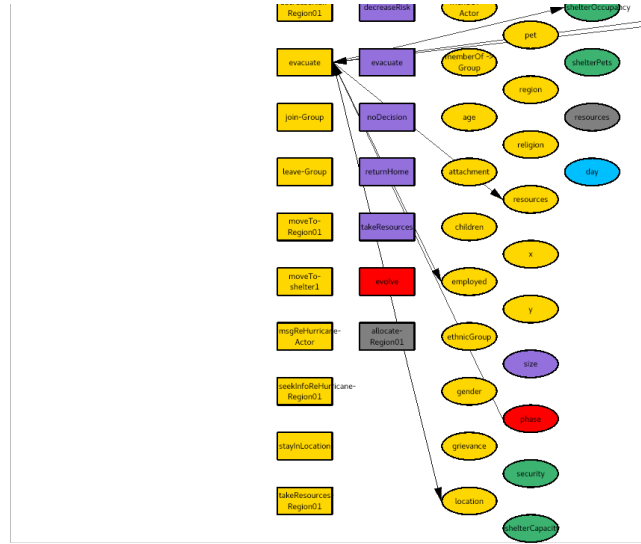


Figure 4: Ground Truth subgraph for Actor-evacuate

4.3.4 Effect on Actor's resources of Actor evacuate

IF Actor's resources > 0.20
 THEN Actor's resources' \leftarrow Actor's resources - 0.20
 ELSE Actor's resources' \leftarrow 0.00

4.4 Actor join Group

4.4.1 Applicability of Actor join Group

IF Actor's alive
 THEN IF Actor memberOf Group
 THEN false
 ELSE true
 ELSE false

4.4.2 Effect on Actor memberOf Group of Actor join Group

Actor memberOf Group' \leftarrow true

4.4.3 Effect on Group's size of Actor join Group

Group's size' \leftarrow Group's size + 1

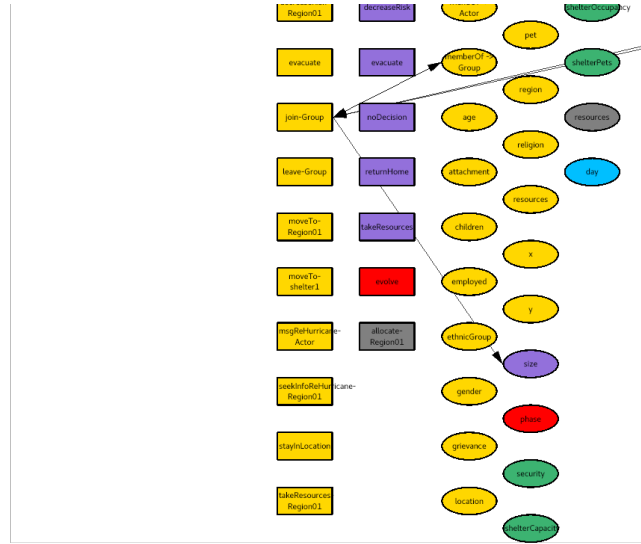


Figure 5: Ground Truth subgraph for Actor-join-Group

4.5 Actor leave Group

4.5.1 Applicability of Actor leave Group

```

IF Actor's alive
  THEN IF Actor memberOf Group
    THEN true
    ELSE false
  ELSE false

```

4.5.2 Effect on Actor memberOf Group of Actor leave Group

Actor memberOf Group' \leftarrow false

4.5.3 Effect on Group's size of Actor leave Group

Group's size' \leftarrow Group's size - 1

4.6 Actor moveTo Region01

4.6.1 Applicability of Actor moveTo Region01

```

IF Actor's location={ 'evacuated', 'shelter1' }
  THEN true
  ELSE false

```

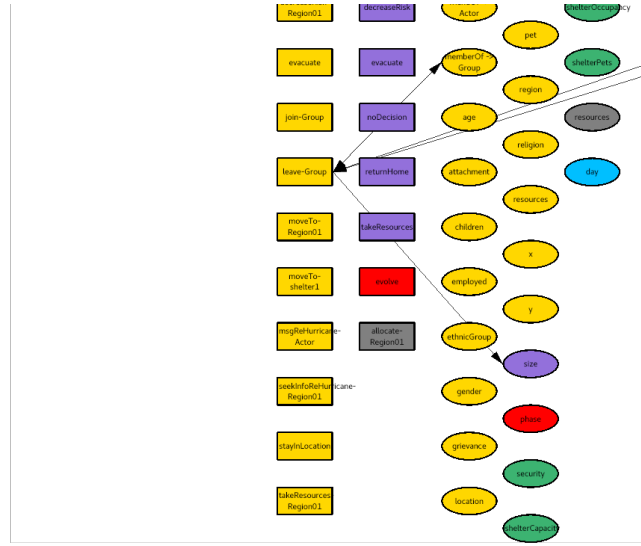


Figure 6: Ground Truth subgraph for Actor-leave-Group

4.6.2 Effect on Actor's location of Actor moveTo Region01

Actor's location' \leftarrow Region01

4.6.3 Effect on Actor's resources of Actor moveTo Region01

IF Actor's alive

THEN IF Actor's employed

THEN Actor's resources' $\leftarrow 80\% \cdot \text{Actor's resources} + 0.20$

ELSE Actor's resources' $\leftarrow 80\% \cdot \text{Actor's resources}$

ELSE Actor's resources' $\leftarrow \text{Actor's resources}$

4.7 Actor moveTo shelter1

4.7.1 Applicability of Actor moveTo shelter1

IF Nature's phase=none

THEN false

ELSE IF Actor's alive

THEN IF Actor's location=shelter1

THEN false

ELSE true

ELSE false

4.7.2 Effect on Actor's location of Actor moveTo shelter1

Actor's location' \leftarrow shelter1

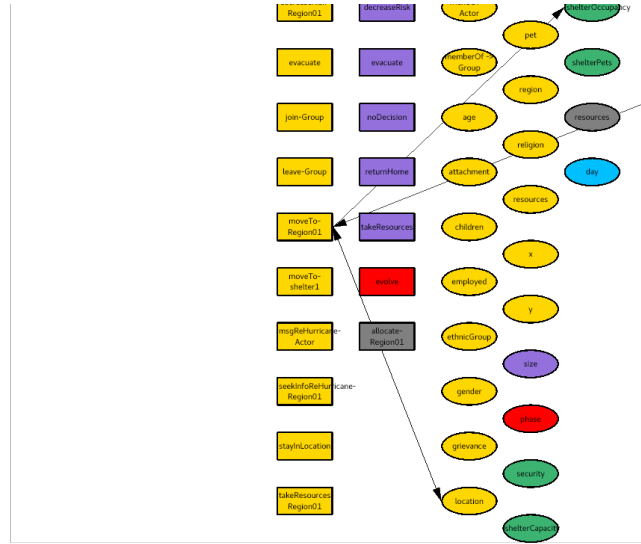


Figure 7: Ground Truth subgraph for Actor-moveTo-Region01

4.7.3 Effect on Actor's pet of Actor moveTo shelter1

```

IF Actor's location' = shelter1
  THEN IF Region01's shelterPets
    THEN Actor's pet' ← Actor's pet
    ELSE Actor's pet' ← false
  ELSE Actor's pet' ← Actor's pet

```

4.8 Actor msgReHurricane Actor

4.8.1 Applicability of Actor msgReHurricane Actor

```

IF Actor's alive
  THEN IF Actor friendOf Actor
    THEN true
    ELSE false
  ELSE false

```

4.9 Actor seekInfoReHurricane

4.9.1 Applicability of Actor seekInfoReHurricane

```

IF Actor's alive
  THEN true
  ELSE false

```

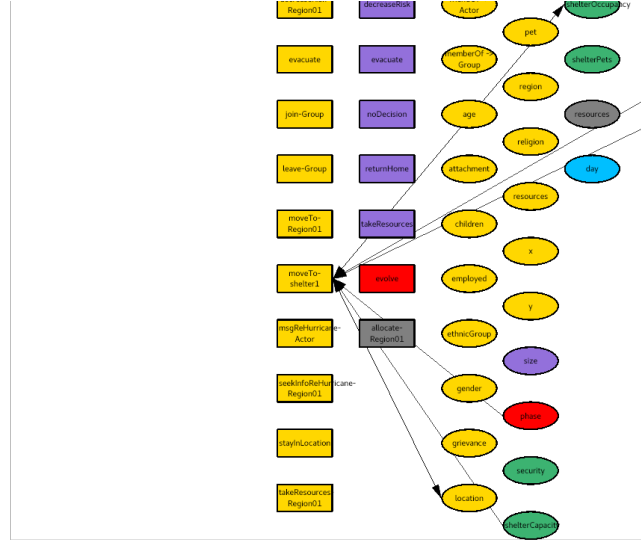


Figure 8: Ground Truth subgraph for Actor-moveTo-shelter1

4.10 Actor stayInLocation

4.10.1 Effect on Actor's resources of Actor stayInLocation

IF Actor's alive

THEN IF Actor's employed

THEN IF Actor's location={ 'Region01', 'evacuated' }

THEN Actor's resources' $\leftarrow 80\% \cdot \text{Actor's resources} + 0.20$

ELSE Actor's resources' $\leftarrow \text{Actor's resources}$

ELSE Actor's resources' $\leftarrow 80\% \cdot \text{Actor's resources}$

ELSE Actor's resources' $\leftarrow \text{Actor's resources}$

4.11 Actor takeResources Region01

4.11.1 Applicability of Actor takeResources Region01

IF Actor's location=Region01

THEN IF Actor's alive

THEN true

ELSE false

ELSE false

4.11.2 Effect on Actor's resources of Actor takeResources Region01

Actor's resources' $\leftarrow 80\% \cdot \text{Actor's resources} + 0.20$

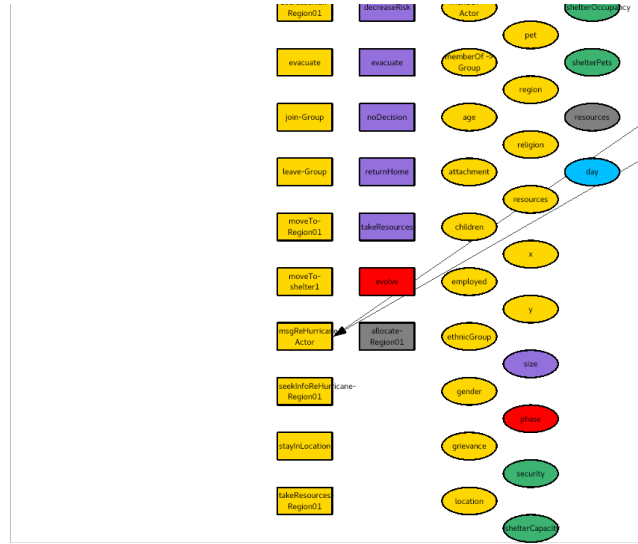


Figure 9: Ground Truth subgraph for Actor-msgReHurricane-Actor

4.11.3 Effect on Actor's risk of Actor takeResources Region01

IF Nature's phase=none

THEN Actor's risk' $\leftarrow 19\% \cdot \text{Actor's risk} + 0.80$

ELSE Actor's risk' $\leftarrow 80\% \cdot \text{Actor's risk} + 0.20$

4.12 System allocate Region01

4.12.1 Applicability of System allocate Region01

IF System's resources > 5

THEN true

ELSE false

4.12.2 Effect on Actor's grievance of System allocate Region01

IF Actor's region=Region01

THEN Actor's grievance' $\leftarrow 80\% \cdot \text{Actor's grievance}$

ELSE Actor's grievance' $\leftarrow 80\% \cdot \text{Actor's grievance} + 0.20$

4.12.3 Effect on Region01's risk of System allocate Region01

Region01's risk' $\leftarrow 90\% \cdot \text{Region01's risk}$

4.12.4 Effect on System's resources of System allocate Region01

System's resources' $\leftarrow \text{System's resources} - 5$



images/Actor-seekInfoReHurricane.png

Figure 10: Ground Truth subgraph for Actor-seekInfoReHurricane

4.13 Group decreaseRisk

4.13.1 Applicability of Group decreaseRisk

```
IF Group's size>0  
  THEN true  
  ELSE false
```

4.14 Group evacuate

4.14.1 Applicability of Group evacuate

```
IF Nature's phase=none  
  THEN false  
  ELSE true
```

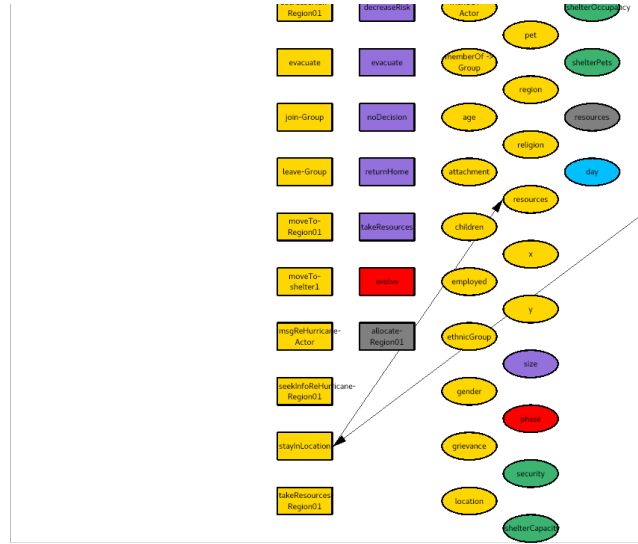


Figure 11: Ground Truth subgraph for Actor-stayInLocation

4.15 Group noDecision

4.16 Group returnHome

4.17 Group takeResources

4.17.1 Applicability of Group takeResources

IF Group's size > 0
 THEN true
 ELSE false

5 Expected Reward

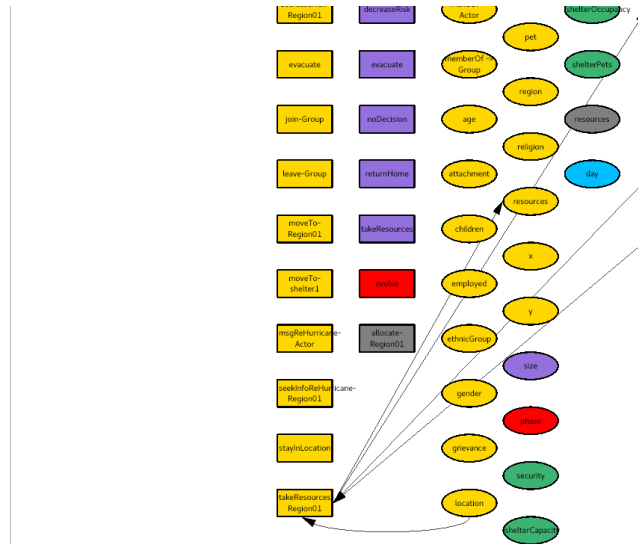


Figure 12: Ground Truth subgraph for Actor-takeResources-Region01

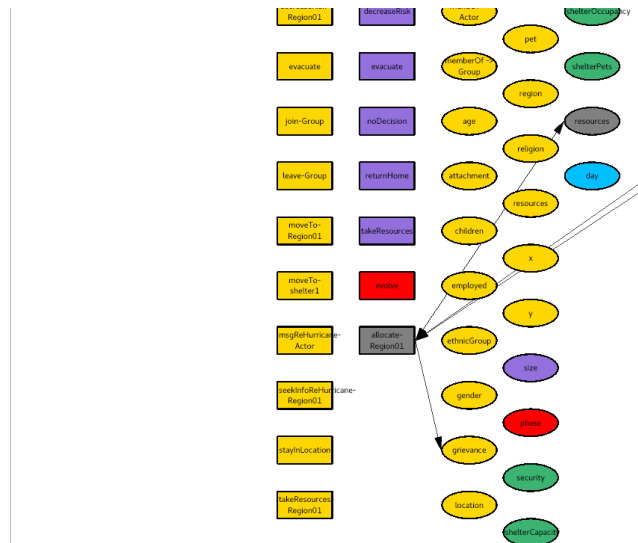


Figure 13: Ground Truth subgraph for System-allocate-Region01

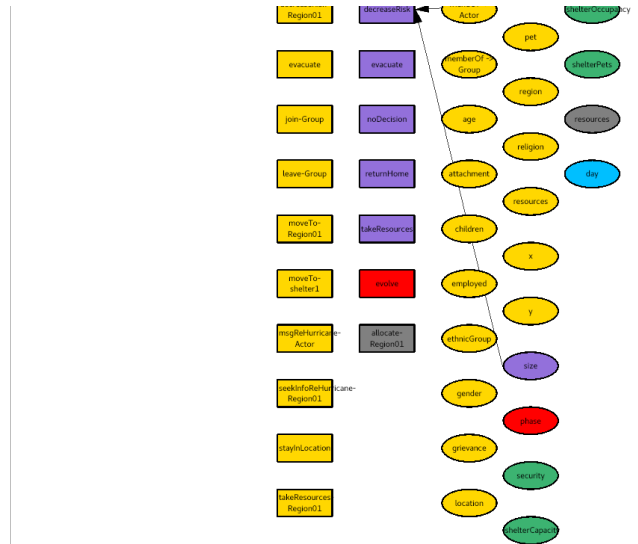


Figure 14: Ground Truth subgraph for Group-decreaseRisk

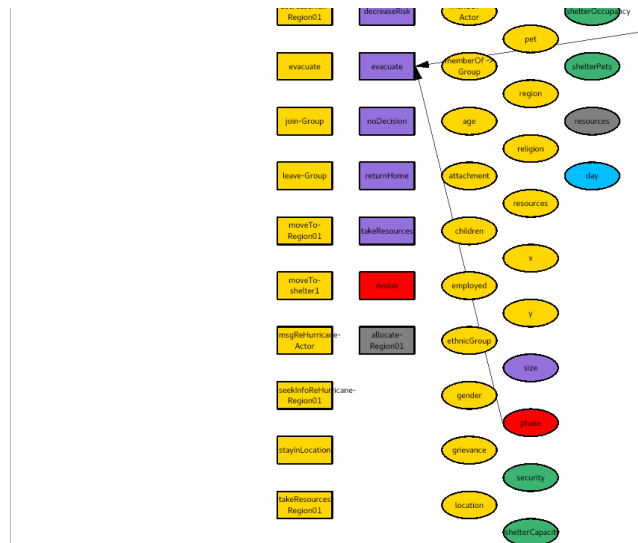


Figure 15: Ground Truth subgraph for Group-evacuate

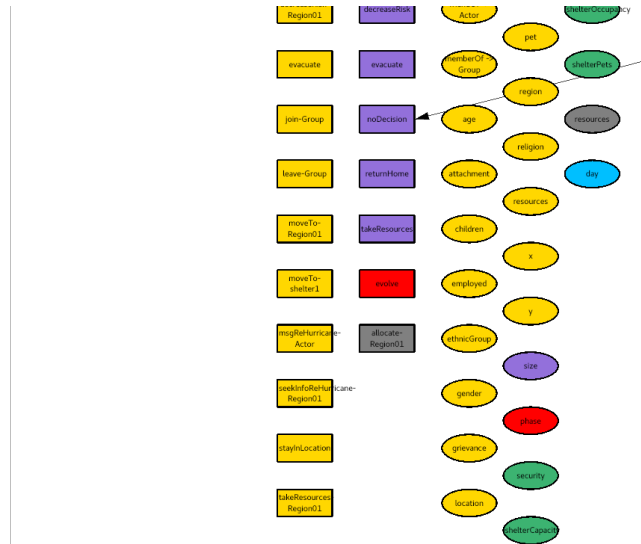


Figure 16: Ground Truth subgraph for Group-noDecision

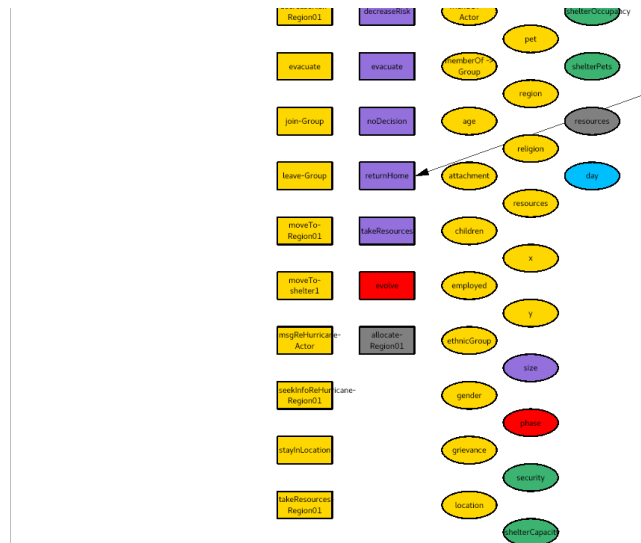


Figure 17: Ground Truth subgraph for Group-returnHome

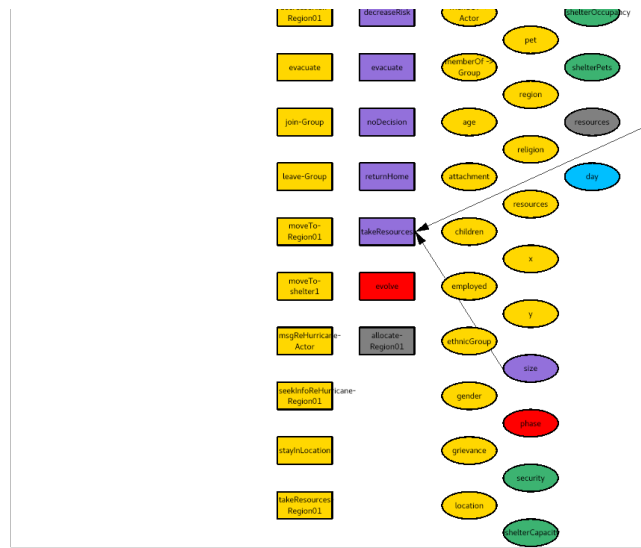


Figure 18: Ground Truth subgraph for Group-takeResources