New dialogue act processed by NLU component

a_u' $P(a_u'=Request(Forward)) = 0.6$
$P(a_u'=Request(Backward)) = 0.4$

Step 1: insertion of new variable a_u

$U(a_m'=Move(Forward)) = 0.4$
$U(a_m'=Move(Backward)) = -0.4$
$U(a_m'=AskRepeat) = 0.5$

a_u' r_{10} a_m'
r_{11}

Step 2: triggering utility model m_1

a_u' $P(a_u'=Request(Forward)) = 0.6$
$P(a_u'=Request(Backward)) = 0.4$
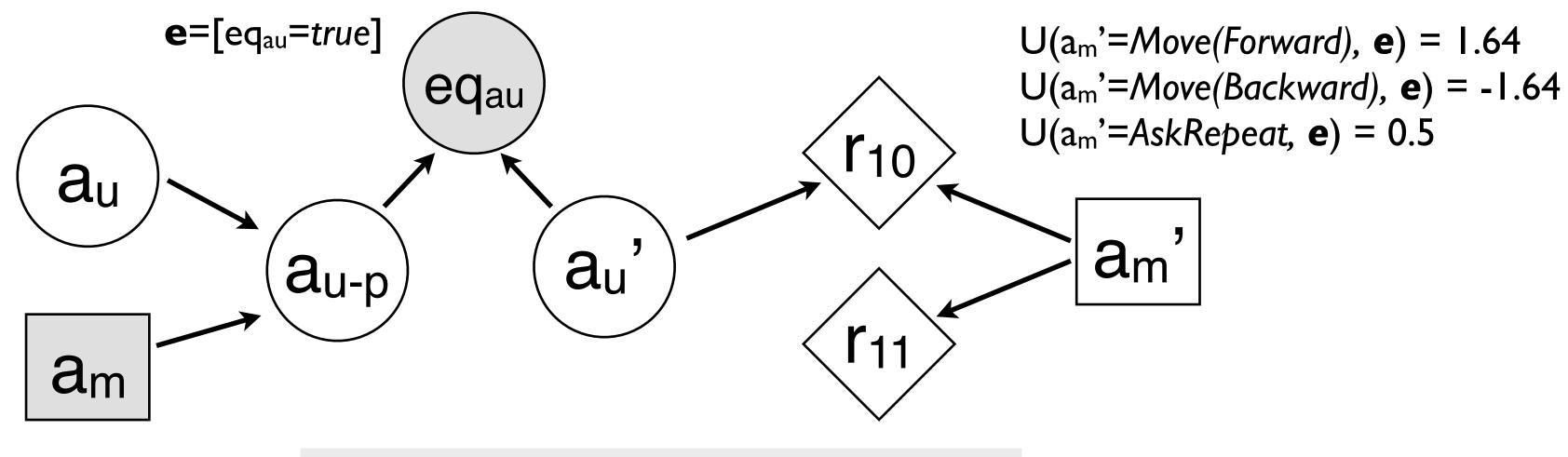
a_m' $a_m' = AskRepeat$

Step 3: selection of optimal action

a_u'
a_m' r_{12} a_{u-p}'
$P(a_{u-p}'=Request(Forward)) = 0.54$
$P(a_{u-p}'=Request(Backward)) = 0.36$

Step 4: triggering prediction model m_2

a_u $P(a_u=Request(Forward)) = 0.6$
$P(a_u=Request(Backward=)) = 0.4$

a_{u-p} $P(a_{u-p}=Request(Forward)) = 0.54$
$P(a_{u-p}=Request(Backward)) = 0.36$

a_m $a_m = AskRepeat$

System response: *AskRepeat*
(picked up by NLG component)

Step 5: state pruning

New dialogue act processed by NLU component

a_u
a_{u-p}
a_m
a_u'
$P(a_u=Request(Forward)) = 0.7$
$P(a_u=Other) = 0.2$
$P(a_u=Request(Backward)) = 0.1$

Step 6: insertion of new variable a_u

$\mathbf{e}=[eq_{au}=true]$

a_u eq_{au}
a_{u-p} a_u'
a_m

$P(a_u'=Request(Forward) \mid \mathbf{e}) = 0.91$
$P(a_u'=Request(Backward) \mid \mathbf{e}) = 0.09$

Step 7: insertion of equivalence node between prediction and observation

$\mathbf{e}=[eq_{au}=true]$

$U(a_m'=Move(Forward), \mathbf{e}) = 1.64$
$U(a_m'=Move(Backward), \mathbf{e}) = -1.64$
$U(a_m'=AskRepeat, \mathbf{e}) = 0.5$

a_u eq_{au}
a_{u-p} a_u' r_{10} a_m'
a_m r_{11}

Step 8: triggering utility model m_1

$\mathbf{e}=[eq_{au}=true]$

a_u eq_{au}
a_{u-p} a_u'
a_m a_m'

$a_m' = Move(Forward)$

Step 9: selection of optimal action

a_u $P(a_u=Request(Forward)) = 0.91$
$P(a_u=Request(Backward)) = 0.09$

a_m $a_m = MoveForward$

System response:
MoveForward
(picked up by NLG and motor control components)

Step 10: state pruning