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Solution for Value Iteration Algorithm:-

Initial State with 2 goal states (one have +1 and another have -1 utility) and remaining all have 0 utilities intially :

Wall	Wall	+1	Wall
0	0	0	0
0	-1	Wall	0
0	0	0	0

Delta= max ([for all states s, |U_t+1(s) - U_t(s)|]) for a particular iteration t+1

After first iteration (1)

Wall	Wall	+1	Wall
-0.05	-0.05	0.75	-0.05
-0.05	-1	Wall	-0.05
-0.05	-0.05	-0.15	-0.05

Delta 0.75>0.05

After _ iteration (2)

Wall	Wall	+1	Wall
-0.1	0.445	0.74	0.54
-0.1	-1	Wall	-0.1
-0.1	-0.1	-0.1	-0.1

Delta 0.59>0.05

After _ iteration (3)

Wall	Wall	+1	Wall
0.286	0.4865	0.8485	0.586
-0.15	-1	Wall	0.362
-0.15	-0.15	-0.15	-0.15

Delta 0.462>0.05

After _ iteration (4)

Wall	Wall	+1	Wall
0.3528	0.57745	0.85725	0.7236
0.0638	-1	Wall	0.4912
-0.2	-0.2	-0.2	0.2096

Delta 0.3596>0.05

After _ iteration (5)

Wall	Wall	+1	Wall
0.45362	0.593545	0.880105	0.75728
0.13862	-1	Wall	0.62712
-0.03896	-0.25	0.07768	0.34392

Delta 0.27768>0.05

After _ iteration (6)

Wall	Wall	+1	Wall
0.48406	0.613438	0.885082	0.792524
0.226758	-1	Wall	0.681248
0.032	-0.112856	0.240672	0.493856

Delta 0.162992>0.05

After _ iteration (7)

Wall	Wall	+1	Wall
0.511833	0.61941	0.890596	0.805443
0.259924	-1	Wall	0.720269
0.123321	0.031252	0.393219	0.568451

Delta 0.152547>0.05

After _ iteration (8)

Wall	Wall	+1	Wall
0.522704	0.624418	0.892485	0.815048
0.285458	-1	Wall	0.738408
0.173396	0.167701	0.483405	0.622382

Delta 0.136449>0.05

After _ iteration (9)

Wall	Wall	+1	Wall
0.530351	0.62643	0.893947	0.819334
0.296709	-1	Wall	0.74972
0.212476	0.253494	0.544587	0.651305

Delta 0.0857933>0.05

After _ iteration (10)

Wall	Wall	+1	Wall
0.53385	0.6278	0.894576	0.822063
0.303951	-1	Wall	0.755411
0.233964	0.311019	0.579962	0.669365

Delta 0.0575248>0.05

After _ iteration (11)

Wall	Wall	+1	Wall
0.53602	0.628441	0.894986	0.823409
0.307475	-1	Wall	0.758732
0.252606	0.345071	0.601485	0.679262

Delta 0.0340525>0.05

Here Delta is less than 0.05 So here we stop and these are the optimal utilities (Final Expected) at this stage.(11)

The Optimal Policy for each state:

		Goal	
East	East	North	West
North	Goal(Negative)		North
East	East	East	North

Optimal Path for this policy is:-

(3,0)-->(3,1)-->(3,2)-->(3,3)-->(2,3)-->(1,3)-->(1,2)-->(0,2)

Using Linear Programming:

State Diagram:-

Wall	Wall	s1	Wall
s2	s3	s4	s5
s6	s7	Wall	s8
s9	s10	s11	s12

Here s1 is maximum utility state and s7 is minimum utility state.

Notations:-

$P_{(i,j)}$:-

i-represents state number

j-reprents opearation

0-no operation

1-North

2-South

3-West

4-East

Example:

P_{11}-represents state 1 operation in North

Values of A:

P_{10}	0.86470
P_{21}	0
P_{22}	0
P_{23}	0
P_{24}	0.12176
P_{31}	0

P_{32}	0
P_{33}	0
P_{34}	0.22833
P_{41}	1.08087
P_{42}	0
P_{43}	0
P_{44}	0
P_{51}	0
P_{52}	0
P_{53}	1.12276
P_{54}	0
P_{61}	0.13698
P_{62}	0
P_{63}	0
P_{64}	0
P_{70}	0.13529
P_{81}	1.12799
P_{82}	0
P_{83}	0
P_{84}	0
P_{91}	0
P_{92}	0
P_{93}	0
P_{94}	1.11111
P_{101}	0
P_{102}	0
P_{103}	0

P_{104}	0.98765
P_{111}	0
P_{112}	0
P_{113}	0
P_{114}	1.11111
P_{121}	0.98765
P_{122}	0
P_{123}	0
P_{124}	0

The Final Expected utility: 0.3285922127

Verification:

Final Expected utlity by value Iteration=0.252606

Final Expected utiliy by linear Programming=0.3285922127

Ratio =0.3285922127/0.252606

= 1.30081