

Approaches			One-best		Lattices	
User simulator	Dialogue manager	Input feature	MAP	Return	MAP	Return
(a) Rule-based	(a-1) DQN	Raw	0.5641	99.31	0.5847	112.24
		Human+Raw	0.5655	107.02	0.5790	101.99
	(a-2) Double DQN	Raw	<b>0.5744</b>	<b>107.08</b>	0.5911	112.14
		Human+Raw	<b>0.5846</b>	<b>115.70</b>	<b>0.5959</b>	<b>102.52</b>
	(a-3) Dueling DQN	Raw	0.5562	96.27	<b>0.5860</b>	<b>113.70</b>
		Human+Raw	0.5665	105.35	0.5784	96.37
(b-1) DQN	DQN	Raw	0.5758	113.02	0.6041	162.85
		Human+Raw	0.5820	130.83	0.6027	162.93
(b-2) Double DQN	Double DQN	Raw	<b>0.6063</b>	<b>190.39</b>	<b>0.6414</b>	<b>224.42</b>
		Human+Raw	<b>0.6066</b>	<b>199.17</b>	<b>0.6375</b>	<b>222.66</b>
(b-3) Dueling DQN	Dueling DQN	Raw	0.5780	108.72	0.5864	157.92
		Human+Raw	0.5757	127.49	0.5723	158.23
(c-1) Double DQN	Dueling DQN	Raw	0.5733	134.20	0.5678	143.83
		Human+Raw	0.5573	111.84	0.5905	146.83
(c-2) Dueling DQN	Double DQN	Raw	<b>0.5899</b>	<b>164.00</b>	<b>0.6494</b>	<b>238.91</b>
		Human+Raw	<b>0.6139</b>	<b>208.25</b>	<b>0.6420</b>	<b>225.72</b>