Interpretation of Emergent Communication in Heterogeneous Collaborative Embodied Agents

Shivansh Patel*, Saim Wani*, Unnat Jain*, Alexander Schwing, Svetlana Lazebnik, Manolis Savva, Angel X. Chang

http://shivanshpatel35.github.io/comon/

Contributions
1. Study different communication mechanisms in multi-agent settings
2. Interpret the studied communication mechanisms

MultiON
Navigate to an ordered sequence of target objects placed within the environment

CoMON
Navigator
Carrying out navigation

• Navigator has to navigate to a sequence of target objects
• Oracle has access to top-down map with goal locations and navigator
• Agents can coordinate by sending messages to each other

Conclusions
• Structured communication agent outperforms unstructured communication agent in navigation
• Structured communication agent come close to matching the success rate of central agent
• Messages akin to ‘I am looking for red goal’ emerge
• Both communication mechanisms lead to emergence of egocentrically grounded messages

Agent Architecture

Communication Mechanisms

S-Comm Interpretation

Messages Exchanged

Quantitative Results

<table>
<thead>
<tr>
<th></th>
<th>PROGRESS (%)</th>
<th>PPL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-ON</td>
<td>2-ON</td>
</tr>
<tr>
<td>U-Comm</td>
<td>87</td>
<td>77</td>
</tr>
<tr>
<td>S-Comm</td>
<td>85</td>
<td>80</td>
</tr>
<tr>
<td>OracleMap</td>
<td>89</td>
<td>80</td>
</tr>
</tbody>
</table>