Chatbot Technology to Teach Active Listening Skills

Michael Judge, Dan Levine, Vishnu Bakthisaran

Introduction

- Parents play a critical role in the lives of children with disabilities.
- Active Listening is an important skill that helps bridge the gap between the family of the child with a disability and the professional, providing better outcomes.
- A large component in teaching Active Listening skills to pre-service professionals is through role playing.
- This project developed a chatbot that plays the role of the parent of a child with a disability so that a pre-service professional can practice Active Listening skills.

Methods and Results

Chat Interface

- The user interacts with a bot (e.g. Joseph) playing out a scenario loaded in the knowledge base.
- The User is awarded points for particular questions set by the administrator.

Naive Bayes Classifier

- The bot chooses what to say by utilizing a Naive Bayes classifier.
- Probabilities are calculated by using word counts.
- The previous response made by the bot is considered in its decision.

\[
P(\text{response}|\text{input}) = \frac{P(\text{input}|\text{response}) \cdot P(\text{response})}{P(\text{input})} = \frac{P(\text{response}) \prod_{i=1}^{n} P(\text{word}_i|\text{response})}{P(\text{input})}
\]

\[
\max_{j} \prod_{i=1}^{n} P(\text{word}_i|\text{response}_j) \cdot P(\text{response}_j|\text{response}_{prev})
\]

Admin Site

- The admin site is used to teach the bot new scenarios to role play.
- Responses are learned by providing example questions.
- Context is learned by linking responses together.
- Responses become more accurate as more examples are learned.
- Points awarded can be set for each response.

Results Summary Page

<table>
<thead>
<tr>
<th>You Said</th>
<th>Joseph Said</th>
<th>Ideal Question</th>
<th>Points Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the solution you want?</td>
<td>The ideal solution</td>
<td>What would you see as the ideal solution?</td>
<td>1</td>
</tr>
<tr>
<td>Why?</td>
<td>Because that is the solution we have been looking for</td>
<td>why</td>
<td>1</td>
</tr>
<tr>
<td>If I was there what how would your son behave?</td>
<td>If you were there, you would see my son running around</td>
<td>If I was there, what would I see?</td>
<td>1</td>
</tr>
<tr>
<td>Have you spoken to anyone else about this issue yet?</td>
<td>Have you spoken to anyone else about this problem</td>
<td>Have you spoken to anyone else about this?</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Score: 4 / 7

Conclusion

- User chat site and admin site implemented
- Chatbot is a retrieval based agent that uses a Naive Bayes classifier to decide what response to reply with.
- Next step is to determine the effectiveness of using a chatbot to teach Active Listening skills.
- Further research can go into assessing alternative and/or improving the current response classifier.

Acknowledgements

We also wish to thank Alan Verbanec, our sponsors, The Hintz Endowment for Communicative Competence at Penn State University, and the Rehabilitation Engineering Research Center on Augmentative and Alternative Communication (RERC on AAC). The RERC on AAC is funded under a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant #90RE5017). NIDILRR is a Center within the Administration for Community Living (ACL); Department of Health and Human Services (HHS). The contents of this poster do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.