Score-Based Recommendation for Efficiently Selecting Individual Virtual Agents in Multi-Agent-Systems

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Introduction

- Embedding Virtual Agents (VAs) raises virtual scene realism
- VAs are required to behave human-like and to be engageable into situation-dependent user-agent interactions
- Meaningful VA actions are often induced by operators, e.g., via Wizard-of-Oz[1]
- Challenging for operators to rapidly decide which VA to control next

Thus, we present:
- Score-based recommendation system to support operators in VA selection
- A GUI embedding this system

GUI
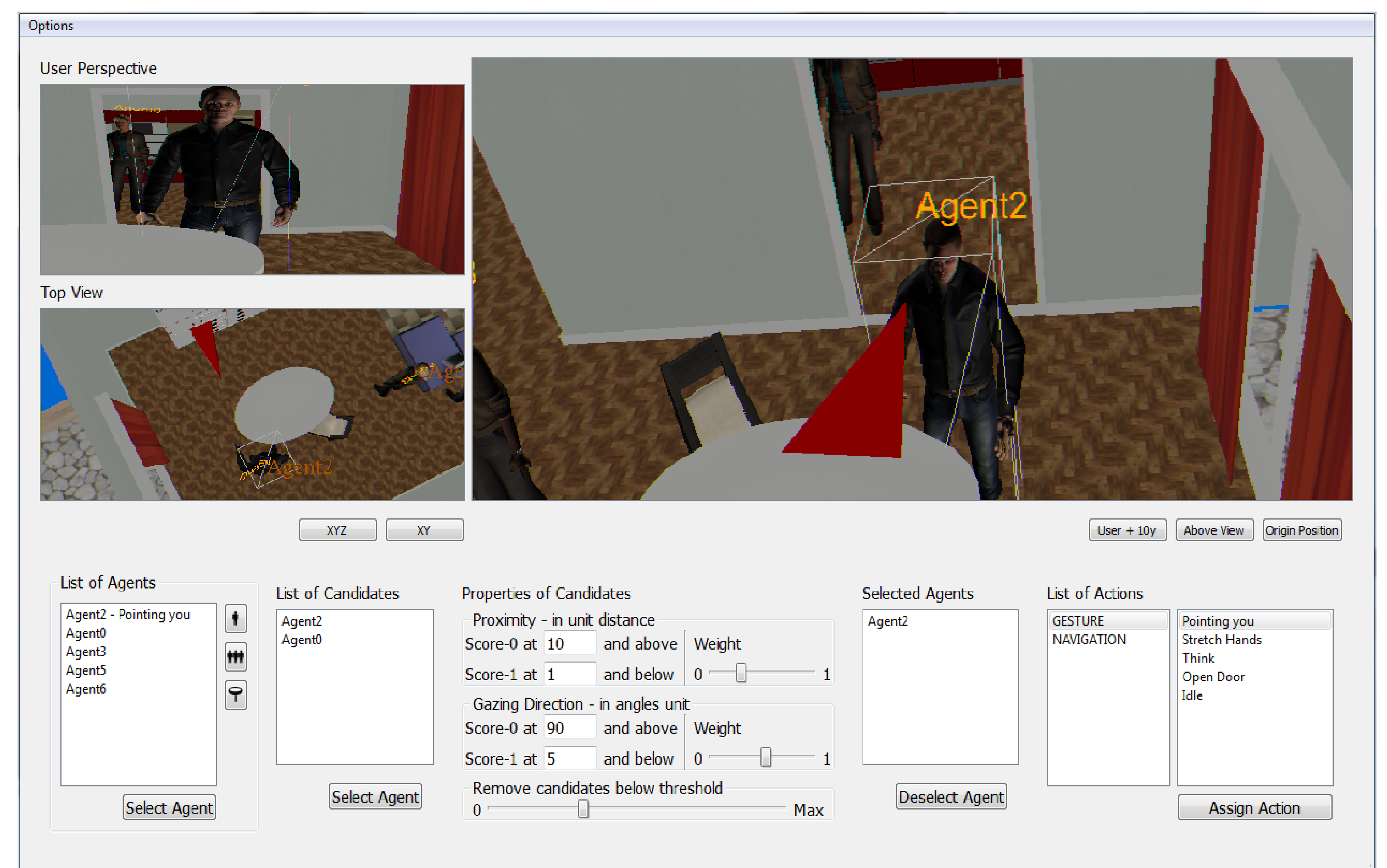
Recommendation Score

Based on two scores:
- Distance Score

$$DS_i = \begin{cases} 1 & \text{if } d_i \leq r_{min} \\ 1 - \frac{d_i - r_{min}}{r_{max} - r_{min}} & \text{if } r_{min} < d_i \leq r_{max} \\ 0 & \text{otherwise} \end{cases}$$

- Gazing Score

$$GS_i = \begin{cases} 1 & \text{if } \alpha_i \leq \beta_{min} \\ 1 - \frac{\alpha_i - \beta_{min}}{\beta_{max} - \beta_{min}} & \text{if } \beta_{min} < \alpha_i \leq \beta_{max} \\ 0 & \text{otherwise} \end{cases}$$
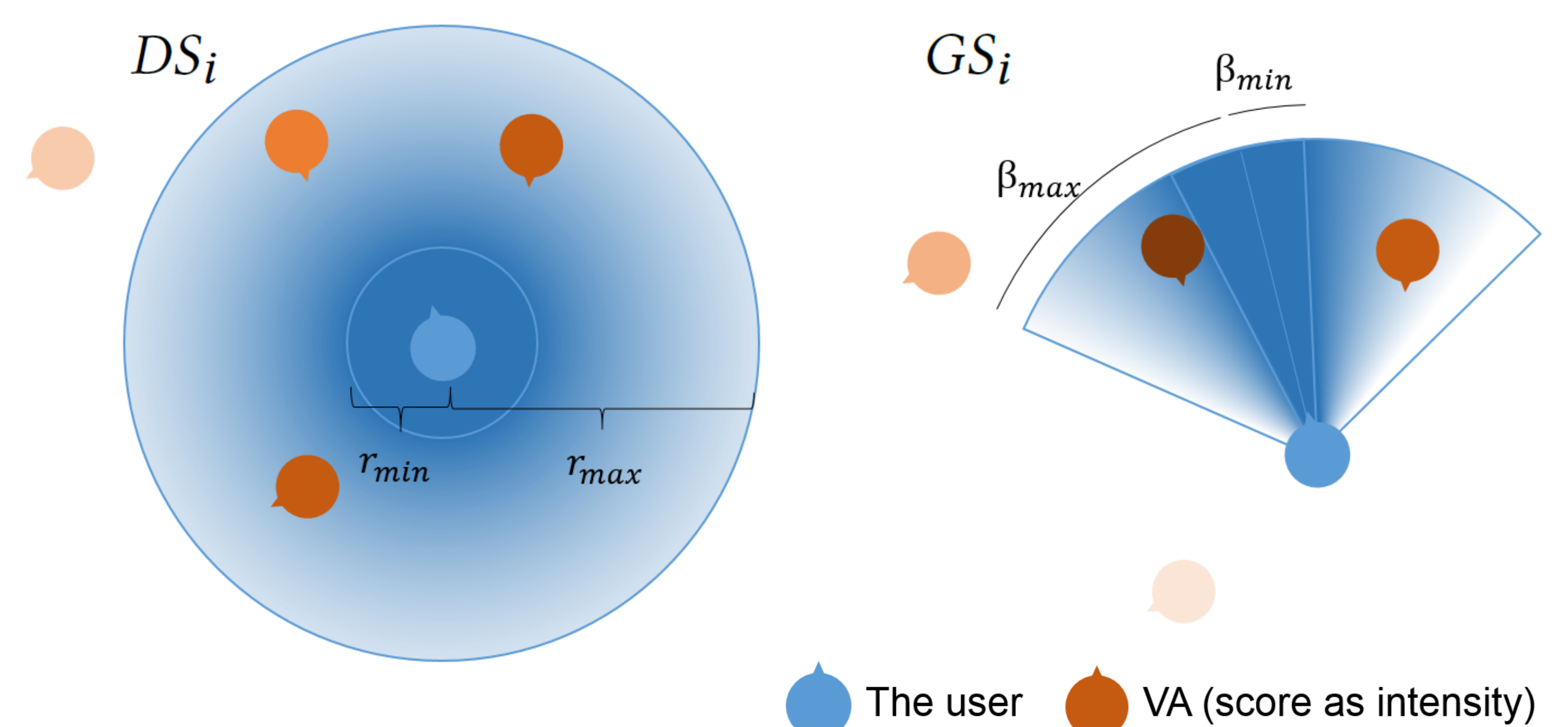
Their weighted sum yields the recommendation score

$$S_i = \omega_{DS} \cdot DS_i + \omega_{GS} \cdot GS_i \quad \text{with } \omega_{DS}, \omega_{GS} \in [0,1]$$

Agents are recommended by descending score S_i

DS_i: inspired by personal space zones (intimate, personal, social and public)[2]
GS_i: based on user's current directional focus, for which face-to-face interactions are preferred

The user   VA (score as intensity)

Preliminary Evaluation

- 6 subjects in the operator's role
- General results:
  - Subjects were able to configure and use the recommendation system
  - Slight improvements to GUI design were suggested

▶ System seems to supports the selection task for situation-dependent user-agent-interaction by an operator

Conclusion and Future Work

- Basic, user-centered and score-based recommendation system supporting the selection of suitable VAs for a situation-dependent user-agent-interaction
- Score extension planned, e.g., by taking occlusions into account
- Automatic suggestion of suitable VA reactions planned

Acknowledgements

References

[1] Jean-Luc Lugrin et al., 2016. Breaking Bad Behaviours: A NewTool for Learning Classroom Management using Virtual Reality. Frontiers in ICT 3 (2016), 26.
[2] Edward T. Hall. 1963. A System for the Notation of Proxemic Behavior. American Anthropologist, 65.5 (1963), 1003–1026.

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