Application of Adaptive Game-Based Learning in Image Interpretation

A. Streicher, W. Roller, C. Biegemeier

Introduction & Objectives

- Increase of learning outcome in aerial and satellite image interpretation; increase motivation (Flow)
- Adaptive serious games for education and training
- Artificial Intelligence (A.I.) for automatic adaptation
- Interoperability for multi-/cross-system applications

Solution Approach & Concept

- Decentralized software architecture and externalized adaptivity logic “E-Learning A.I.” (ELAI)
- Minimal-invasive, bi-directional game engine adapter
- Usage data collection (xAPI) → Learning Analytics
- Genre-specific adaptation strategies → Adaptivity
- Usage of interoperability standards, e.g. xAPI, HLA
- Applicable to heterogeneous application scenarios and different game engines (e.g. Unity, Unreal)
- Related work e.g. ALIGN, RAGE, TLA

Application

- Application in a map-based Seek & Find serious game for aerial image interpretation
  - Game objectives: identify and differentiate various vehicle types, orientate and learn surroundings
  - Adaptivity according to domain-specific models, e.g.,
    - Injection of Intelligent Virtual Agents (IVA) for context-adaptive help & recommendations
    - Dynamic Difficulty Adjustments, e.g. generated clouds, model-based image modifications, etc.
  - Rules-based information extraction (Didactic Factors); basis for A.I., e.g., clustering, classification, etc.

Usage Data Analysis

- Small user study, n=12, test + control groups
  - H1: recognition of adaptivity OK
  - H2: feeling of ‘increased motivation’ OK
  - H3: measurable learning effect inconclusive

Conclusion

- Successful application of the interoperable adaptivity framework “ELAI” for simulations and serious games
- Small user study indicates acceptance for adaptivity and increased motivation, but learning outcome inconclusive