Software Components for Serious Game Development

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Starting points

- Applied games (serious games) are useful
  - Social problems, health, education/training
  - Driving diversity and innovation
  - Creating jobs
- Applied games are typically "low budget, low tech" ("poor cousins" of the leisure game industry)
- Applied game industry is highly fragmented
  - >3000 small companies across Europe
  - No key players
  - Limited knowledge sharing
  - Plenty of re-inventing the wheel

The RAGE project

- H2020 Research and Innovation Action in advanced gaming technologies (ICT-21)
- Partners from
  - Games Industry
  - Research
  - Education and Training
  - Business Innovation

To support (serious) game studios with new technologies.
Making available advanced game technology components to develop Applied Games easier, faster and more cost-effectively.

RAGE reusable game software components

1. Data analysis
   - Data capturing
   - Sensors
   - Emotion detection
   - Competences
   - Learning analytics
   - Assessment
   - Evaluation

2. Game intelligence
   - Social agents
   - Natural language
   - Dialogues
   - Game balancing
   - Storytelling
   - Procedural animation
   - Gamification

What new technologies?

- Data analysis
- Data capturing
- Sensors
- Emotion detection
- Competences
- Learning analytics
- Assessment
- Evaluation

Rageproject.eu

Coping with technological diversity

- Corinna, Miriam, Holger, Weikum, Gajewski

Portability/Interoperability

- Single sign-on, authentication, authorization
  - Open standards
  - Interoperability
  - Open source options
RAGE Client-asset architecture

- Avoids dependencies of external software frameworks/libraries
- Based on established software patterns and abstraction
- Avoids any interference with the user interface
- Principal client-side code bases: C# and TypeScript

Examples

- Emotion recognition
- Natural language processing
- Performance statistics

Example 1: Real-time emotion recognition

1. Face detection
2. Facial landmarks (37-64 points)
3. Emotion extraction
   - training data set
   - fuzzy logic rules
   - accuracy ~80%

Example 2: Natural language processing

- I cannot speak English
- I can speak English
- I can speak French

Communication training

Job seekers interview training

Example 2: Natural language processing

- Readerbench services (RESTful)
  - Textual cohesion
  - Textual complexity
  - Semantic annotation
  - Sentiment analysis / opinion mining
  - Essay grading
  - Conversation analysis
  - Readerbench.com (English, French)
Example 2: Natural language processing

Example 3: performance statistics

Example performance visualization

Goal:
- Provide teachers with reliable statistics on student performance in serious games and protect teachers against making interpretation mistakes.

Approach:
- Send student scores from a client-side game to a server-side analytics system
- Compare student scores to group scores
- Present visualizations of performance when requested by the teacher

Interpretation:
- Include interpretation info and possibly a warning for misinterpretation.

Example performance visualization

- x-axis: number of trials completed
- y-axis: score
- N: the number of participants in this trial
- Red cross & white line represents player’s current performance at his/her number of currently completed trials

Interpretation: The performance falls within the group mean. The performance is average.

Warning: The collection contains only 3 data points for this trial; therefore these scores may not represent the population performance. For a more accurate estimate, wait until more students have played the game.

N = 3