

ISLA: An Algorithmic Approach to Assisted Narrative Planning and Assembly

...

Djyron Sarroza
MSCS

Introduction

ISLA: Intelligent Story Layout Assistant

Knowledge-Base

- Domains
- Sequence Terms
- Chapter Patterns
- Location Maps
- Actor and Object Names

Knowledge-Base: Domains

- Encodes the rules in the story-telling universe
- Uses Planning Domain Definition Language (PDDL)
 - Section 2.2.3

Knowledge-Base: Narrative Chapter Patterns

- Sequence Terms
 - Embodies the template for a single narrative chapter
 - Essentially composed of:
 - Actors and objects involved
 - Goals that needs to be fulfilled
- Chapter Patterns
 - A chapter pattern is a series of sequence terms that embodies a general story pattern
 - **Villainy -> ConfrontVillain -> DefeatVillain -> HeroReward** can be considered a chapter pattern for a generic “hero overcomes villain” story.
 - Sequence terms can belong to multiple chapter patterns, allowing for increased flexibility and variety

Knowledge-Base: Supporting Elements

- Actor and Object Names
 - Location Maps
- Both are simple GUI to facilitate supporting narrative information

Narrative Planner

- Core Planner
 - Goal Graph
 - Plan Graph
- Chapter Chainer

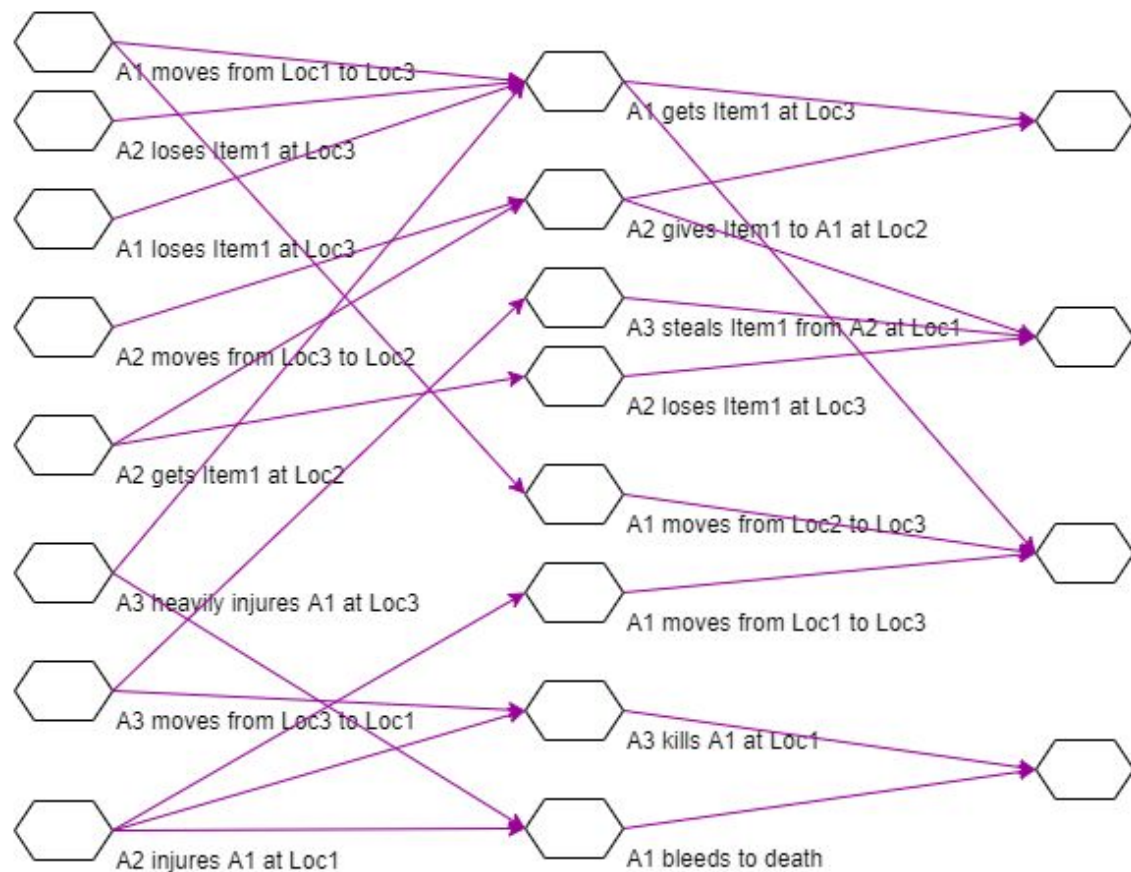
Narrative Planner: Core Planner

- For reference, multiple algorithms were studied:
 - POCL
 - IPOCL
 - CPOCL
 - GLAIVE
- Based on GLAIVE
 - Sec 2.2.5.4
- Forward-chaining

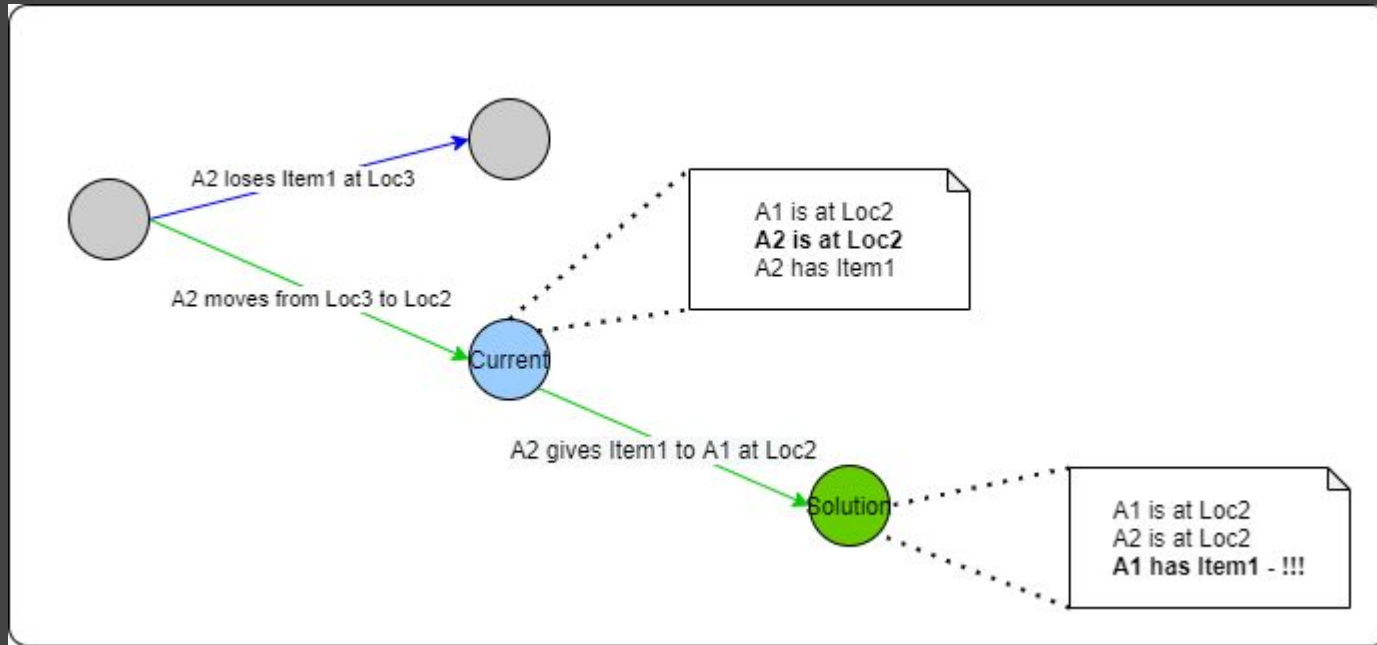
Narrative Planner: Core Planner - How it Works

- Demo

https://app.diagrams.net/#G15_sHCwkh3ctynK-RI6cRGBWMKlYEsmTk



Narrative Planner: Core Planner - Plan Graph



**REVIEW OF LITERATURE
and
THEORETICAL FRAMEWORK**

Conceptualization

- Narratology (section 2.2.2)
- Narratives and Mathematics (section 2.2.3)
 - Narratology for Math
 - Improving user interfaces for theorem provers
 - Narrative structure of mathematical texts and lectures
 - Math for Narratology
 - Narrative analysis using proof assistant tool

Plot Evaluation

- Challenges with Objective Evaluation (section 2.3.1)
- Tellability (section 2.3.2)

Initial Results

Initial Results

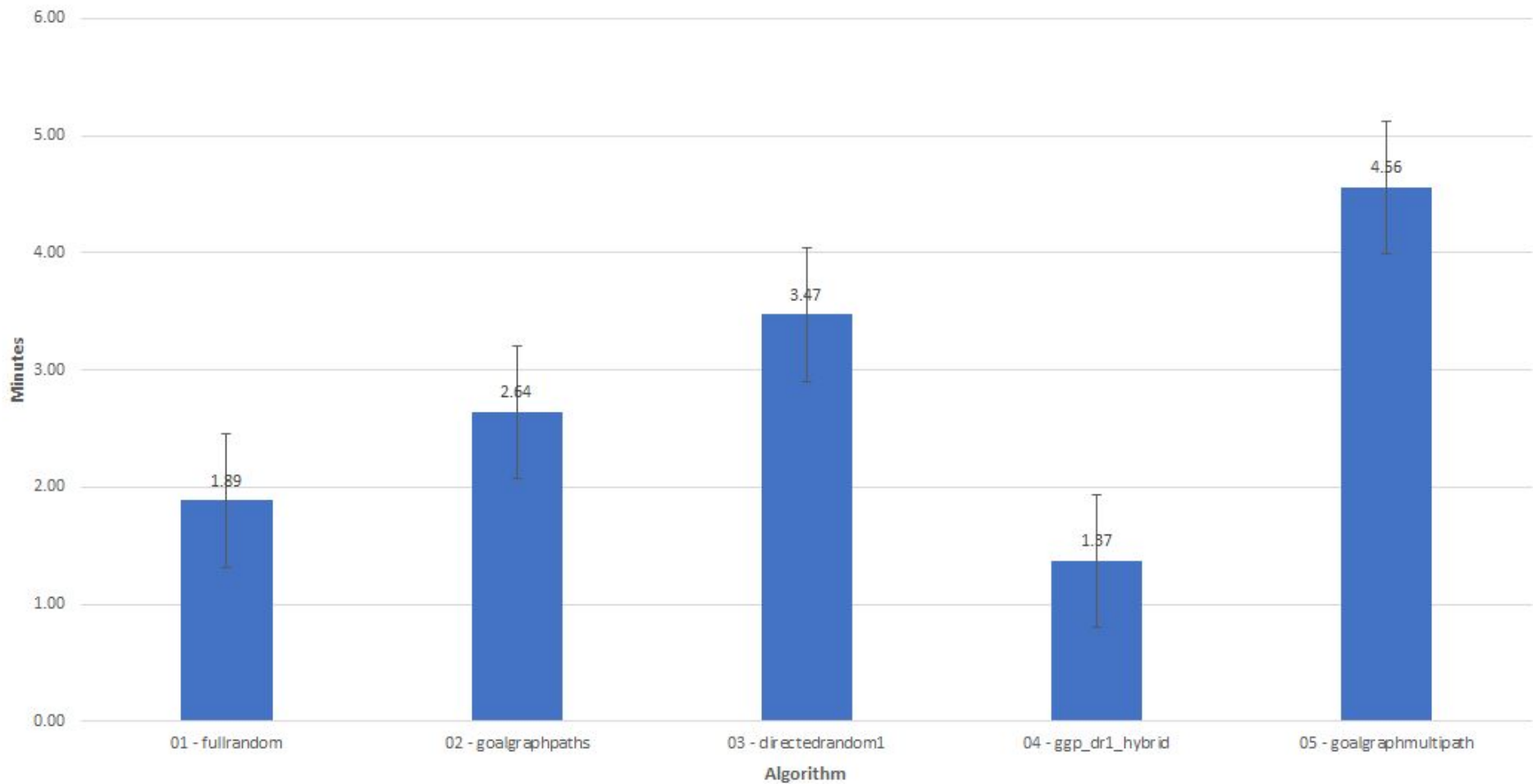
Initial Results - Story Archive

- Multiple domains
- GUI improvements

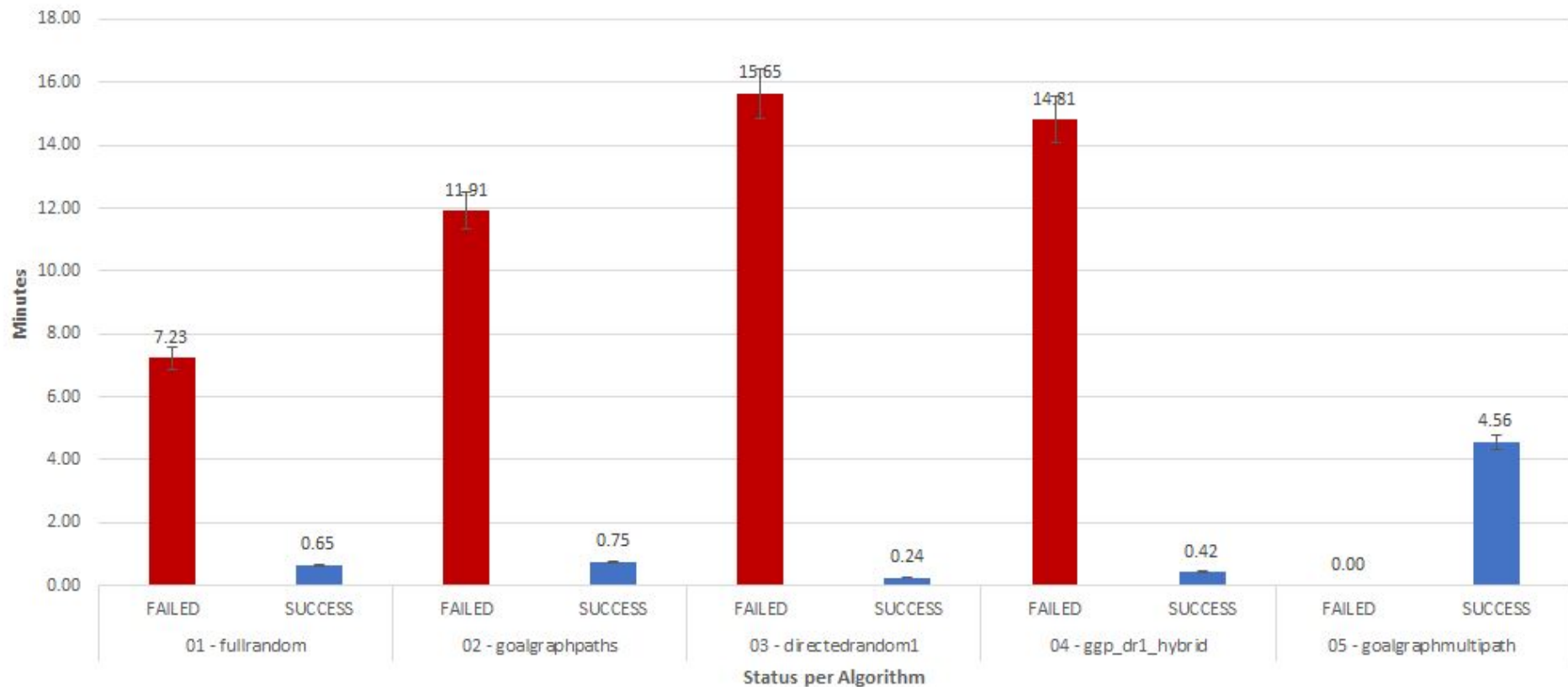
Initial Results - Performance

- Using a small test domain
- Multiple algorithms
- Multiple location maps

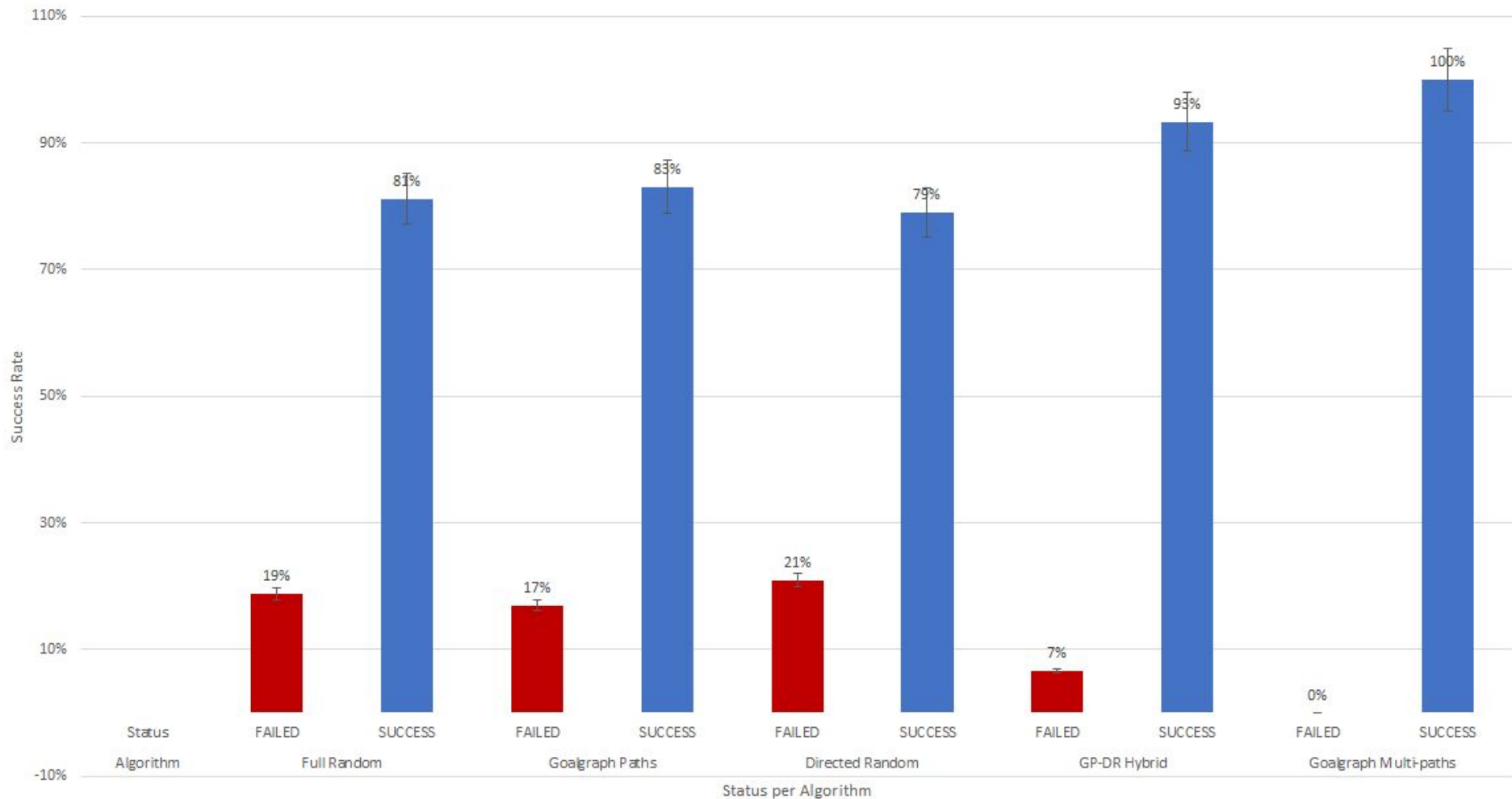
Average Runtime per Algorithm (using Small Fantasy Domain)



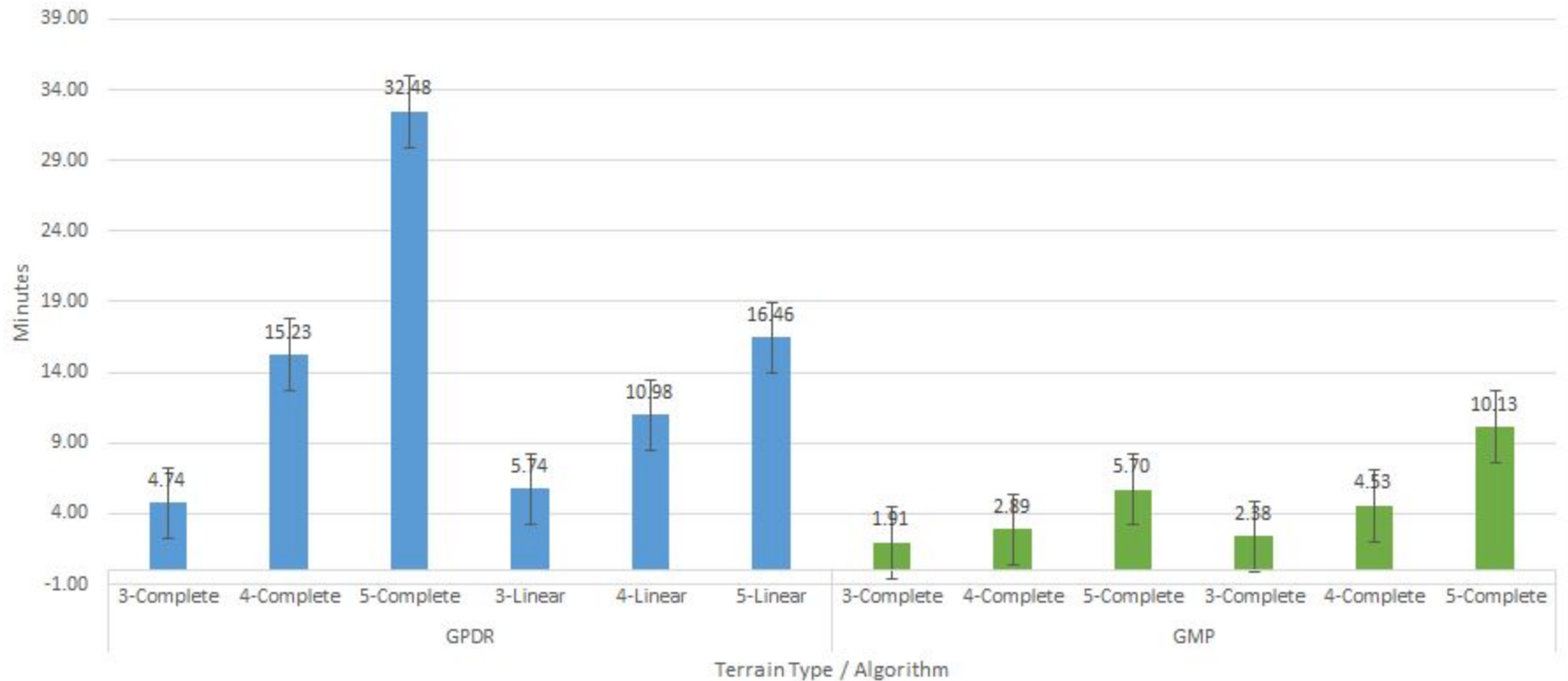
Average Runtime per Algorithm - Success/Failed Breakdown (using Small Fantasy Domain)



Success Rate per Algorithm (using Small Fantasy Domain)



Runtime per Terrain Type using GPDR and GMP Algorithms (Minutes)



GPDR: Goal Graph Paths - Directed Random Hybrid

GMP: Goal Graph Multipaths

Updated Results - Domain Quality Metrics

- State Predicate Criticality
 - How “important” a predicate is for domain actions
 - A negative criticality score for predicate P means some actions require that P is **not present** in the current state for those actions to be applied
 - A positive criticality score for predicate P means some actions require that P is **present** in the current state for those actions to be applied
- State Predicate Mutability
 - How actions can change the predicate
 - A negative mutability score for predicate P means some actions are able to **remove** P from the current state
 - A positive mutability score for predicate P means some actions are able to **add** P from the current state

Updated Results - Domain Quality Metrics

Present in Initial State?	Predicate Metric	Test Intention	Success Rate
Absent	Zero Criticality	Seek to Remove	100%
		Seek to Add	100%
	Zero Mutability	Seek to Remove	100%
		Seek to Add	0%
Present	Zero Criticality	Seek to Remove	100%
		Seek to Add	100%
	Zero Mutability	Seek to Remove	0%
		Seek to Add	100%

These are the results when the state predicates (with zero criticality and zero mutability) are plugged in as chapter goals.

Updated Results - Difficulty in Measuring Computational Creativity

A Standardised Procedure for Evaluating Creative Systems

Anna Jordanous

“...we assume an intuitive understanding of the concept of creativity but lack a universally accepted and comprehensive definition of the concept. There have been many efforts to capture and talk about creativity in words but the above discussion demonstrates that no definitive consensus has yet been reached on exactly what creativity is. Multiple viewpoints exist, many of which prioritise different aspects of creativity.”

- Lack in universal direction, in spite of generally positive interest in the research community
- An entire field of study by itself

Updated Results - Computational Measure: Tellability

Towards a Computational Measure of Plot Tellability - Leonid Berov

1. semantic opposition: “reversals in the fortunes of characters” and contrasts between “goals of characters with the results of their actions”,
 2. semantic symmetry: structural similarities in sequences of events pertaining to different characters, or to the same character at different stages of the plot,
 3. functional polyvalence: the same event fulfilling several narrative functions at the same time,
 4. suspense: a delay between the adoption of a goal by a character and its achievement/failure,
 5. dynamic points: the violation of a character’s expectation.
- This approach is being investigated, but may require a separate, dedicated paper of its own

Updated Results - Computational Measure: Tellability (cont.)

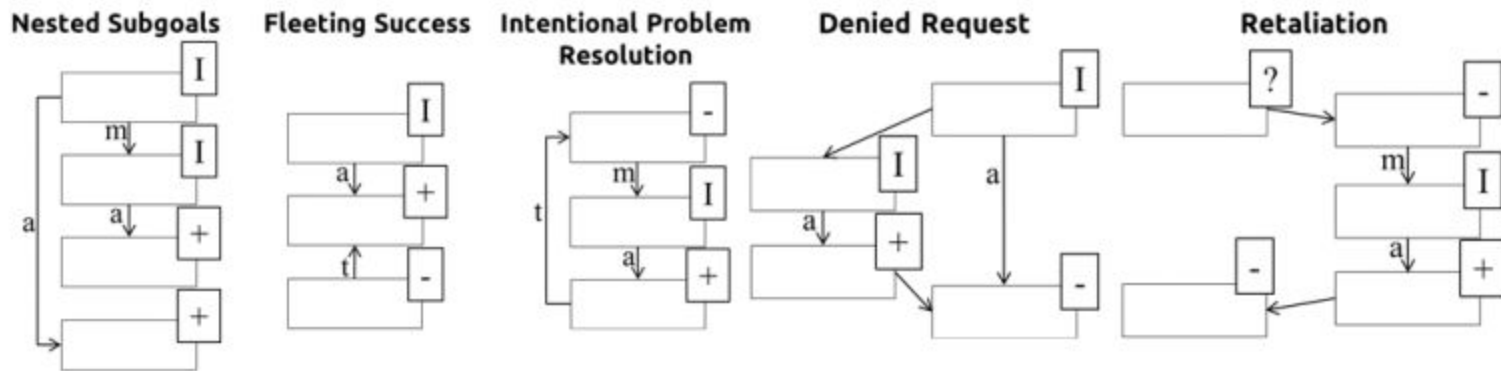


Figure 1: Examples of complex plot units; '?' is a wildcard for arbitrary vertex type. Adopted from (Lehnert 1981).

- “Plot units” as explored by Berov and introduced by Lehnert (1981) seems to closely resemble ISLA’s “chapter patterns”
- Since chapter patterns are manually defined in ISLA, it may be argued that [ISLA’s] tellability score is independent of the algorithms used for narrative planning

Updated Results - Computational Measure: Tellability (cont.)

- However, since the chapter patterns approach is an important difference* of ISLA from GLAIVE, it may also be argued that ISLA's tellability score is higher than GLAIVE's

** Chapter 3.3 in the manuscript*

Industry Professionals Interview and Survey

Average score, with a range between -3 and +3

1. Did you find ISLA easy to use?
 - 0.33 - “Neutral”
2. Did you find ISLA helpful in layouting stories?
 - 1.33 - “Slightly Helpful”
3. How sensible is this particular generated story?
 - 1.33 - “Slightly Sensible”

Industry Professionals Interview and Survey

Average score, with a range between 0 and 5

1. How helpful is ISLA as a tool for authors / creative writers?
 - 3 - “Useful, but needs more improvements in many areas”
2. How helpful is ISLA as a tool for game developers / game content creators?
 - 2 - “ISLA has a tiny glimmer of potential”

Industry Professionals Interview and Survey

“[This story] was more interesting for me. But it might also be because I can visualize possible "reasons" behind the unfolding events more. Could be cause I favor the genre more.”

“Lots of potential with what you have so far. Lots of potential functions in different ways.”

Adjectives: arbitrary, dramatic, twisty, interesting, amusing, cute, structured, dull, objective, plain

Antonio Gabriel "Tobie" Abad IV

Creative Director, Head Game Designer of Taktyl Studios

Industry Professionals Interview and Survey

“It seems harder to setup something than just write an outline then make a story from there. I do usually start with world building first, because the rules will always be established first before you can make stories out of it. I have a bit of difficulty using the tool. But it's great to know that you can control scenarios and not just everything is randomly generated, so I think this tool is best used for game designers that concentrate on narratives. Just needs a bit of tweaking.”

Core suggestion: Fix UI

Dr. Beatrice Margarita V. Lapa

Professor at De La Salle-College of Saint Benilde, Senshi.Labs

Industry Professionals Interview and Survey

“Great potential! Not for established authors, since they already have their own mental model for creating stories, but seems like a good tool for writers when used in writing exercises. ISLA looks useful for game development purposes.”

Inception: Inspired the idea to use ISLA as a teaching tool

Juan Karlo Licudine

Co-Founder and Lead Game Developer

Mindcake Games

ISLA as a Teaching Tool

Initial Survey Results - Students

Average score, with a range between -3 and +3

N = 22

1. Did you find ISLA easy to use?
 - 0.45: “Neutral”
2. Did you find ISLA helpful in layouting stories?
 - 1.14: “Slightly Helpful”
3. How sensible is this particular generated story?
 - 1.18: “Slightly Sensible”

Initial Survey Results - Students

Average score, with a range between 0 and 5

N = 22

1. In your opinion, how helpful is ISLA as a tool for authors / creative writers?
 - 3.68 - “Useful, but needs more improvements in many areas”
2. In your opinion, how helpful is ISLA as a tool for game developers / game content creators?
 - 3.81 - “Useful, but needs more improvements in many areas”

Initial Survey Results - Teachers

- Exercises have

Updated Results

Updated Results - Domain Quality Metrics

- State Predicate Criticality
 - How “important” a predicate is for domain actions
 - A negative criticality score for predicate P means some actions require that P is **not present** in the current state for those actions to be applied
 - A positive criticality score for predicate P means some actions require that P is **present** in the current state for those actions to be applied
- State Predicate Mutability
 - How actions can change the predicate
 - A negative mutability score for predicate P means some actions are able to **remove** P from the current state
 - A positive mutability score for predicate P means some actions are able to **add** P from the current state

Updated Results - Domain Quality Metrics

Present in Initial State?	Predicate Metric	Test Intention	Success Rate
Absent	Zero Criticality	Seek to Remove	100%
		Seek to Add	100%
	Zero Mutability	Seek to Remove	100%
		Seek to Add	0%
Present	Zero Criticality	Seek to Remove	100%
		Seek to Add	100%
	Zero Mutability	Seek to Remove	0%
		Seek to Add	100%

These are the results when the state predicates (with zero criticality and zero mutability) are plugged-in as chapter goals.

Updated Results - Difficulty in Measuring Computational Creativity

A Standardised Procedure for Evaluating Creative Systems

Anna Jordanous

“...we assume an intuitive understanding of the concept of creativity but lack a universally accepted and comprehensive definition of the concept. There have been many efforts to capture and talk about creativity in words but the above discussion demonstrates that no definitive consensus has yet been reached on exactly what creativity is. Multiple viewpoints exist, many of which prioritise different aspects of creativity.”

- Lack in universal direction, in spite of generally positive interest in the research community
- An entire field of study by itself

Updated Results - Using Tellability as a Measure

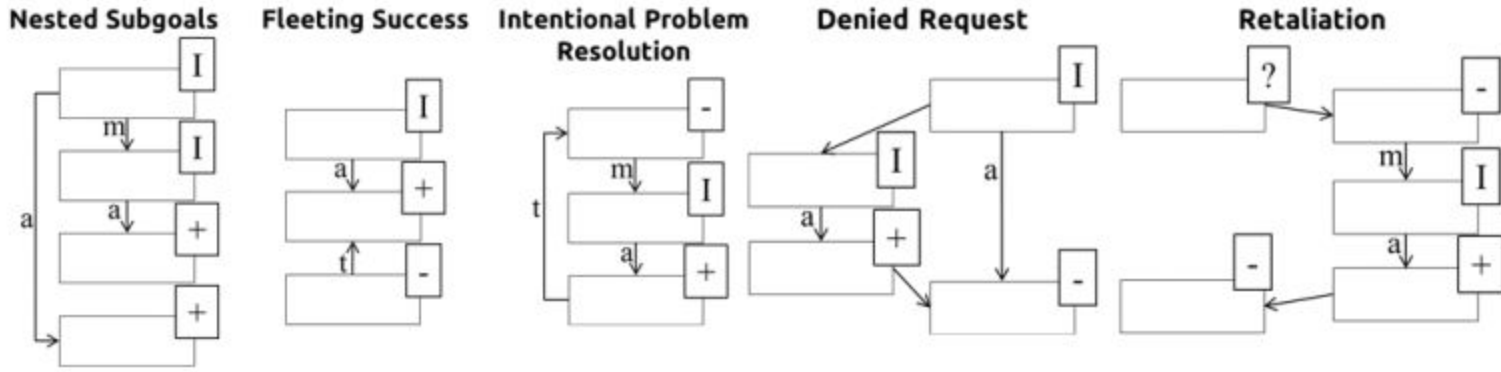


Figure 1: Examples of complex plot units; '?' is a wildcard for arbitrary vertex type. Adopted from (Lehnert 1981).

- “Plot units” as explored by Berov and introduced by Lehnert (1981) seems to closely resemble ISLA’s “chapter patterns”
- Since chapter patterns are manually defined in ISLA, it may be argued that [ISLA’s] tellability score is independent of the algorithms used for narrative planning

Updated Results - Using Tellability as a Measure (cont.)

- Illaoi **obtained** Unknown_Cylinder at Central Command (*Subgoal 1 achieved*)
- Illaoi became focused (*Positive emotion*)
- Illaoi **obtained** DNA_Sample at Central Command (Subgoal 2 achieved)
- Illaoi moves from Central Command to engineering
- Illaoi **drops** DNA_Sample at Engineering (*Subgoal 2 un-achieved*)

Updated Results - Using Tellability as a Measure (cont.)

- However, since the chapter patterns approach is an important difference* of ISLA from GLAIVE, it may also be argued that ISLA's tellability score is higher than GLAIVE's

* Chapter 3.3 in the manuscript

Industry Professionals Interview and Survey

Average score, with a range between -3 and +3

1. Did you find ISLA easy to use?
 - 0.33 - “Neutral”
2. Did you find ISLA helpful in layouting stories?
 - 1.33 - “Slightly Helpful”
3. How sensible is this particular generated story?
 - 1.33 - “Slightly Sensible”

Industry Professionals Interview and Survey

Average score, with a range between 0 and 5

1. How helpful is ISLA as a tool for authors / creative writers?
 - 3 - “Useful, but needs more improvements in many areas”
2. How helpful is ISLA as a tool for game developers / game content creators?
 - 2 - “ISLA has a tiny glimmer of potential”

Industry Professionals Interview and Survey

“[This story] was more interesting for me. But it might also be because I can visualize possible "reasons" behind the unfolding events more. Could be cause I favor the genre more.”

“Lots of potential with what you have so far. Lots of potential functions in different ways.”

Adjectives: arbitrary, dramatic, twisty, interesting, amusing, cute, structured, dull, objective, plain

Antonio Gabriel "Tobie" Abad IV

Creative Director, Head Game Designer of Taktyl Studios

Industry Professionals Interview and Survey

“It seems harder to setup something than just write an outline then make a story from there. I do usually start with world building first, because the rules will always be established first before you can make stories out of it. I have a bit of difficulty using the tool. But it's great to know that you can control scenarios and not just everything is randomly generated, so I think this tool is best used for game designers that concentrate on narratives. Just needs a bit of tweaking.”

Core suggestion: Fix UI

Dr. Beatrice Margarita V. Lapa

Professor at De La Salle-College of Saint Benilde, Senshi.Labs

Industry Professionals Interview and Survey

“Great potential! Not for established authors, since they already have their own mental model for creating stories, but seems like a good tool for writers when used in writing exercises. ISLA looks useful for game development purposes.”

Inception: Inspired the idea to use ISLA as a teaching tool

Juan Karlo Licudine

Co-Founder and Lead Game Developer

Mindcake Games

ISLA as a Teaching Tool

Initial Survey Results - Students

Average score, with a range between -3 and +3

N = 27

1. Did you find ISLA easy to use?
 - 0.33: “Neutral”
2. Did you find ISLA helpful in layouting stories?
 - 1.30: “Slightly Helpful”
3. How sensible is this particular generated story?
 - 1.26: “Slightly Sensible”

Initial Survey Results - Students

Average score, with a range between 0 and 5

N = 27

1. In your opinion, how helpful is ISLA as a tool for authors / creative writers?
 - 3.66 - “Useful, but needs more improvements in many areas”
2. In your opinion, how helpful is ISLA as a tool for game developers / game content creators?
 - 3.85 - “Useful, but needs more improvements in many areas”

Initial Survey Results - Teachers

ISLA is generally acceptable to the participating teachers, and have acknowledged ISLA's capacity as a teaching tool. Initial comments have described ISLA's impact as "time-saving" and "creates interest in the subject".

Future Work

Conclusions

Questions?