



A Tool for Automating Sizing in Agile Development Using the COSMIC Method

By

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Bruel Géranson, Ph. D

- Bruel Géranson received a master degree in MIS from the University of Quebec at Montreal (UQAM); a PhD in cognitive computing at UQAM.
- Research interest lies on the software development process, functional size measurement, automatic natural language processing (NLP), Artificial Intelligence, Software Quality Assurance

Aims and Contribution

In our paper we aimed at:

Developing a tool for Automating Sizing in Agile Development Using the COSMIC Method

Contribution:

- We developed a new approach that facilitates measuring the functional size of agile development.
- We developed a tool, which semantically identifies and generates the triplet from items of product backlog written in natural language and automatically determines the functional size of agile development.

Introduction

The measure of the functional size of agile development projects

- Plays an important role in software engineering.
- Allows project managers to establish reliable estimation and productivity models [11][18].
- In other words, it is a key factor that allows for estimating the effort, the cost of developing software products, and performing an analysis of the performance of the software development team

Estimation in agile development projects

- In agile development, User Story Points (USP) are considered an estimated relative level of the effort required to complete a User Story (Murat and al; 2017; Raharjana and al; 2021)
- Estimation is important because it allows the project manager to identify which requirements to prioritize for each iteration and whether these requirements or User Stories could be completed during the iteration [7].
- Automating the measurement of the functional size of agile projects is a priority for managers and agile teams.
- Most agile development projects measure their requirements in user story points [2].

Limitations of User Story Points

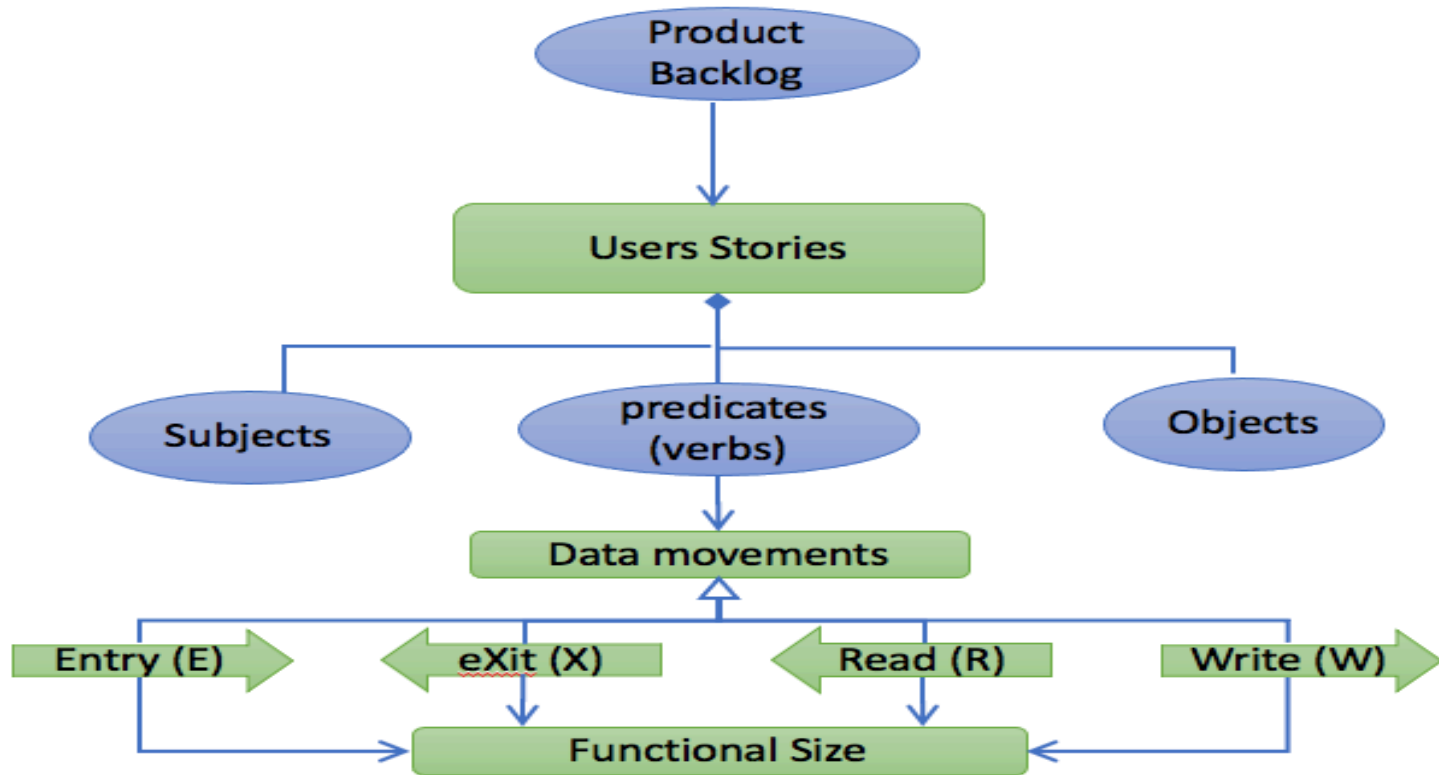
- *The limitations of User Story Points for measuring agile development projects are that it is not possible to standardize their value from one project to another or from one organization to another*
- *The value is subjective and specific to the development team that assigned it [2][6][7].*
- *The User Story Point does not represent a measure of functional size but rather an effort estimate [1][3][8].*

Problematic

- Agility is one of the industry's most widely used software development approaches.
- Agile development project is supposed to deliver the functionalities for the product owner as soon as possible.
- However, automating sizing in agile development remains difficult.
 - The software's functional size measurement methods are challenging to scale for agility.
 - In the industry, managers and scrum masters use empirical methods to estimate the size of user stories manually.
- Necessary to propose *A Tool for Automating Sizing in Agile Development Using the COSMIC Method*



Tool to automate agile project sizing



Tool developed

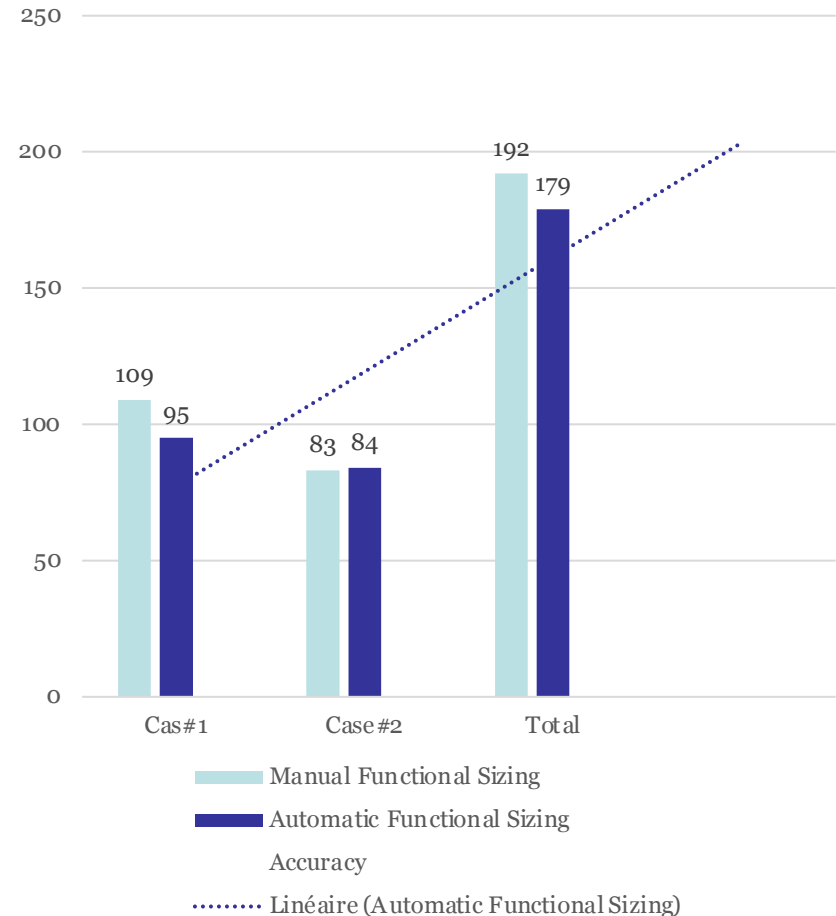
- We developed a tool that automatically performs the functional size measurement on the User Stories of a product backlog.
- Our tool integrates a set of Natural Language Processing (NLP) techniques, which semantically identifies the subjects, verbs, and objects from User Stories written in natural language.
- In such a perspective, we presume that a software requirement written as a User Story refers to an actor (subject) that triggers an action or a system operation (verb or data movement) on an object.
- We applied several rules in COSMIC for identifying the verbs that correspond to a type of data movement (Entry, Exit, Read, Write) and quantifying the number of verbs (data movement), which refers to the functional size [9].

Results of our research

Manual functional and Automatic sizing comparisons

Project	Manual Functional Sizing	Automatic Functional Sizing	Accuracy
Case#1	109	95	93.14%
Case#2	83	84	98.80%
Total	192	178	95.97%

Manual and automatic functional sizing



English ▾

Use word document ▾

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Triplets list and other statistics

Functional Process	Triplets	Entry	Exit	Read	Write	Sum CFP	Include
Add a Professor	registrar,enters,detail	1	0	0	0	1	<input checked="" type="checkbox"/>
Add a Professor	C-Reg,checks,detail	0	0	1	0	1	<input checked="" type="checkbox"/>
Add a Professor	C-Reg,creates,professor	0	0	0	1	1	<input checked="" type="checkbox"/>
Add a Professor	registrar,displays,message	0	1	0	0	1	<input checked="" type="checkbox"/>
Enquire on a Professor	registrar,enters,professor	1	0	0	0	1	<input checked="" type="checkbox"/>
Enquire on a Professor	C-Reg,retrieves,professor	0	0	1	0	1	<input checked="" type="checkbox"/>
Enquire on a Professor	C-Reg,displays,professor	0	1	0	0	1	<input checked="" type="checkbox"/>
Enquire on a Professor	registrar,displays,error	0	1	0	0	1	<input checked="" type="checkbox"/>
Modify a Professor	registrar,modifies,detail	0	0	0	1	1	<input checked="" type="checkbox"/>
Modify a Professor	C-Reg,validates,detail	1	0	0	0	1	<input checked="" type="checkbox"/>
Modify a Professor	registrar,displays,error	0	1	0	0	1	<input checked="" type="checkbox"/>
Delete a professor	C-Reg,asks,course	1	0	0	0	1	<input checked="" type="checkbox"/>
Delete a professor	catalog,replies,"yes	1	0	0	0	1	<input checked="" type="checkbox"/>
Delete a professor	C-Reg,deletes,professor	0	0	0	1	1	<input checked="" type="checkbox"/>
Delete a professor	registrar,displays,error	0	1	0	0	1	<input checked="" type="checkbox"/>
Enquire on Course Offerings (Professor)	professor,enters,ID	1	0	0	0	1	<input checked="" type="checkbox"/>
Enquire on Course Offerings (Professor)	C-Reg,retrieves,professor	0	0	1	0	1	<input checked="" type="checkbox"/>
Enquire on Course Offerings (Professor)	C-Reg,sends,professor	0	1	0	0	1	<input checked="" type="checkbox"/>
Enquire on Course Offerings (Professor)	C-Reg,sends,department	0	1	0	0	1	<input checked="" type="checkbox"/>

Automatically Measured Functional Size

Monitor Student Schedule Enrolment progress	C-Reg,displays,schedule	0	1	0	0	1	✓
Close Registration	registrar,selects,registration"	1	0	0	0	1	✓
Close Registration	C-Reg,receives,course	1	0	0	0	1	✓
Close Registration	C-Reg,checks,student	0	0	1	0	1	✓
Close Registration	C-Reg,sends,statuses	0	1	0	0	1	✓
Close Registration	C-Reg,sends,schedule	0	1	0	0	1	✓
Close Registration	C-Reg,retrieves,student	0	0	1	0	1	✓
Close Registration	C-Reg,sends,info	0	1	0	0	1	✓
Total Of Sum CFP		30	43	12	10	95	

Evaluation and Validation of Results

- We tested the tool with two (2) agile development projects for which the items in the product backlog are written in the form of User Stories
- Results of the tool compared with those of human experts
- The manually measured results of these projects: published and available on the COSMIC website
- The research showed that our tool offers automated results consistent with the manual results, with an average accuracy of 95.97%

Conclusion

- We proposed a new tool designed to automate the functional sizing of agile development projects from the items in a product backlog.
- Our tool can effectively identify the subjects, predicates or verbs, and objects derived from User Stories and quantifies the number of data movements, which refers to the functional size.
- The validation of our tool needs to cover the potential cases.
- In the future, extensive testing will be performed to improve the tool's efficiency.
- Integration of a machine learning module, which allows the tool to learn to identify the data movement for the User Stories that are not described according to the recommended standard format.

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