**Research Questions & Search Strings & Inclusion Exclusion Criteria**

**Research questions and respective search string**

**RQ-1:**  Is self-adaptation realized in software platforms for smart cities?

**RQ-2:** Which concerns (goals) of adaptation are handled in software platforms for smart cities?

**Keywords:** Smart city platforms, smart city software architecture, self-adaptation, MAPE-K, adaptation goals

**Search string for RQ-1 and RQ-2**

"smart city" AND (platform OR software OR system OR framework) AND (adaptation OR adaptive OR "self-adaptation" OR "self-adaptive" OR "MAPE-K")

**RQ-3:** Which kinds of services are developed for smart cities using Big data analytics?

**RQ-4:** Which Big Data technologies are used in software platforms for Smart Cities?

**Keywords:** smart city, machine learning, data analytics, big data platform, urban data

**Search String for RQ-3 and RQ-4**

("smart city") AND (platform OR software OR system OR framework) AND ("urban data analytics" OR "big data analytics" OR "machine learning")

**Inclusion and Exclusion Criteria**

***Inclusion criteria:***

* Studies focuses on the development of smart city software platforms
* Studies in which self-adaption is explicitly used for the development of smart city platform
* Studies in which smart applications are developed for smart cities by using self-adaptation
* Studies in which machine learning and data mining techniques are used for the development of smart city applications
* Studies subject to peer review (e.g., journal articles, conference papers)
* Studies published after Jan 2010

***Exclusion Criteria:***

* Secondary or tertiary studies (e.g., systematic literature reviews, surveys, etc).
* Studies in the form of editorials, tutorial, poster papers because they do not provide enough information.
* Studies that are not written in English.
* Studies which are not available in full text.
* Duplicate papers.

**Search String Execution for RQ-1 and RQ-2**

**Black** values denote the initial search period (a decade) 2010-2020, while **blue** values are the additional number of studies in the period 2021-2023. For this last triennium papers, we did not use Scopus to accelerate the upgrade of the review and avoid dealing with many duplicate papers that may result from Scopus.

1. Stats of papers collected after search string execution:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 299 +162 | 52 +96 | 351 + 258 |
| ACM | 628 +367 | 47 +136 | 675 + 503 |
| Springer | 169 +14 | 37 +54 | 206 + 68 |
| Scopus | 163 | 77 | 240 |
| ScienceDirect | 10 +5 | | 10 + 5 |
| 1482+ 834 = 2316 | | | |

1. Stats of papers achieved after title and abstract based screening:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 33+ 46 | 9 + 32 | 42 + 78 |
| ACM | 36+ 5 | 4+ 9 | 40 + 14 |
| Springer | 25+1 | 13+ 8 | 38+ 9 |
| Scopus | 12 | 15 | 27 |
| ScienceDirect | 12 + 1 | | 12+1 |
| **159** + 102 = 261 | | | |

1. Inclusion/exclusion criteria screening:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 5 + 6 | 2 + 2 | 7 + 8 |
| ACM | 8 + 2 | 2 + 2 | 10 + 4 |
| Springer | 8 + 0 | 3 + 2 | 11 + 2 |
| Scopus | 4 | 1 | 5 |
| ScienceDirect | 3 + 1 | | 3 + 1 |
| **36+ 15 = 51** | | | |

**Search String Execution for RQ-3 and RQ-4**

**Black** values denote the initial search period (a decade) 2010-2020, while **blue** values are the additional number of studies in the period 2021-2023. For this last triennium papers, we did not use Scopus to accelerate the upgrade of the review and avoid dealing with many duplicate papers that may result from Scopus.

1. Stats of papers collected after search string execution:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 190 +222 | 25 +55 | ~~216~~ 215 + 277 |
| ACM | 394 +346 | 56 31+125 | 450 + 471 |
| Springer | 61 +176 | 27 25+61 | 88 + 237 |
| Scopus | 146 | 74 | 220 |
| ScienceDirect | 46 +36 | | 46 + 36 |
| **1019** + 1021 = 2040 | | | |

1. Stats of papers achieved after title and abstract based screening:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 95 + 64 | 15 + 16 | 110 + 80 |
| ACM | 38 + 60 | 23 + 10 | 61 + 70 |
| Springer | 19 + 33 | 20 + 18 | 39 + 51 |
| Scopus | 48 | 8 | 56 |
| ScienceDirect | 20 + 9 | | 20 + 9 |
| 286 + 210 = 496 | | | |

1. Inclusion/exclusion criteria screening:

|  |  |  |  |
| --- | --- | --- | --- |
| **Search Engine** | **Conference Papers** | **Journal Papers** | **Total** |
| IEEE Explore | 29 + 21 | 12 + 7 | 41 + 28 |
| ACM | 15 + 26 | 8 + 5 | 23 + 31 |
| Springer | 14 + 14 | 7 + 8 | 21 + 22 |
| Scopus | 4 | 2 | 6 |
| ScienceDirect | 12 + 3 | | 12 + 3 |
| **103 + 84 = 187** | | | |