PRISMA 2020 Checklist

Manuscript: Artificial Intelligence-Driven Self-Healing Bioinformatics Pipelines: A Systematic Review of Automated Failure Detection and Remediation in Omics and Computational Biology Workflows

Authors: Bipul Bhattarai, Naina Maharjan, Sulav Dahal | PROSPERO: CRD420261361756 | Journal: PLOS Computational Biology

Section/Topic	Item #	Checklist item	Location
TITLE			
	1	Identify the report as a systematic review.	Title page
ABSTRACT			
	2	See the PRISMA 2020 for Abstracts checklist.	Abstract, p.1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction, lines 54-62
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Introduction, lines 63-70; Methods RQ1-RQ5, lines 77-86
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods: Eligibility criteria, lines 87-94; S1 Table
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods: Search strategy, lines 95-101; S5 Table
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	S5 Table (Supporting Information)
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved for eligibility, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods: Study selection, lines 102-114; S2 Table
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods: Data extraction, lines 115-119; S3 Table
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods: Data extraction, lines 115-119; S3 Table
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods: Data extraction, lines 115-119
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods: Quality assessment, lines 120-128; S4 Table

Section/Topic	Item #	Checklist item	Location
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A — narrative synthesis adopted; no pooled effect measures calculated (heterogeneity precluded meta-analysis, stated lines 129-134)
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis).	Methods: Data synthesis, lines 129-134; Results organised by RQ
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing statistics, and any processes used to standardise or convert data from included studies.	Methods: Data synthesis, lines 129-134
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Results: Table 1; Figures 1-2
	13d	Describe any methods used to synthesise results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Narrative synthesis — meta-analysis not possible due to heterogeneity (lines 129-134)
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A — heterogeneity explored narratively by RQ and study design
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesised results.	N/A — sensitivity analysis not applicable to narrative synthesis
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Results: Evidence quality assessment, lines 233-248; publication bias noted
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Methods: Data synthesis, lines 129-134 (adapted GRADE approach)
RESULTS			
Study selection	16a	Describe the results of the search and selection process, including reasons for exclusions at each stage of the process, ideally using a flow diagram.	Results: Study selection, lines 143-150; Fig 1 (PRISMA flow diagram)
	16b	Cite studies that might appear to meet the inclusion criteria but which were excluded, and explain why they were excluded.	S2 Table (Screening log with reasons)
Study characteristics	17	Cite each included study and present its characteristics.	Results: Table 1 (26 studies); S3 Table
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Results: Evidence quality, lines 233-248; S4 Table
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (if appropriate) and (b) an effect estimate and its precision (e.g. confidence interval), ideally using structured tables or plots.	Results: RQ1-RQ5 (lines 150-248); Table 1; narrative synthesis
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results: Evidence quality assessment, lines 233-248

Section/Topic	Item #	Checklist item	Location
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision and measures of statistical heterogeneity.	N/A — narrative synthesis only
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Results: Discussion of heterogeneity across RQ sections
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesised results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Results: Evidence quality, lines 246-248 (92% positive findings noted)
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Results: Organised by GRADE certainty level (high/moderate/low/very low) per RQ
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion: Interpretation, lines 259-278
	23b	Discuss any limitations of the evidence included in the review.	Discussion: Four-layer model limitations implicit; Conclusion lines 306-335
	23c	Discuss any limitations of the review processes used.	Methods: kappa score limitation lines 106-114; protocol deviation lines 135-141
	23d	Discuss implications of the results for practice, policy, and future research.	Conclusion: Three research directions, lines 319-335
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods line 73-75; PROSPERO CRD420261361756
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	PROSPERO: https://www.crd.york.ac.uk/PROSPERO/view/CRD420261361756
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Methods: PRISMA compliance, lines 135-141; PROSPERO v1.1 updated 7 April 2026
Support	25	Describe sources of financial or other support for the review, and the role of the funders or sponsors in the review.	Acknowledgments: no funding received
Competing interests	26	Declare any competing interests of review authors.	Acknowledgments / submission form: none declared
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Supporting Information: S2-S5 Tables; PROSPERO registration

From: Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/