Measuring Institutional AI-Related Publication Activity in India

An Auditable Model-Assisted Pilot of 25 Institutions from 2015 to 2025

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Study status This working paper reports an auditable, model-assisted descriptive analysis of a purposive cohort. Work-level labels are model outputs. The only comparison uses labels generated or adjudicated by AI agents and accepted by the project owner; it is not independent human validation or a population-performance estimate. The study makes no ranking, quality, capability, or causal claim. Public readers can verify deposited aggregates and checksums; full record-level recomputation requires authorised access to the hashed v0.2 inputs.

Version note Version 1.1 corrects the repository identifiers and recalculates the internal agreement check directly against frozen v0.2 outputs. The descriptive dataset and substantive results are unchanged.

Abstract

Estimates of artificial-intelligence publication activity depend on database coverage, topic filters, institutional crosswalks, model rules, and counting conventions. We construct an auditable descriptive panel for a purposively selected, nonrepresentative cohort of 25 Indian institutions from 2015 to 2025. Candidates were drawn from the OpenAlex core corpus using direct institution affiliations, publication years 2015 to 2025, and AI subfield 1702, then linked to frozen ROR identifiers and classified by Jev. The v0.2 corpus contains 41,172 works and 44,609 institution-work links. The operational primary series contains 14,714 articles and conference papers labelled AI-core or AI-adjacent, with Jev-reported selected-label choice probability at least 0.75 and an abstract. In the 79-record overlap between an 88-record agent-adjudicated development comparison set and v0.2, exact three-class agreement was 73 of 79 (92.4%); nine comparison records were absent. These are not independent human-validation results. Operationally included output increased from 659 works in 2015 to 2,338 in 2025; within-cohort collaboration covered 1,160 works (7.9%). Results describe the frozen cohort and rule only; they do not estimate national output, quality, capability, or causal effects.

Keywords India artificial intelligence scientometrics OpenAlex ROR research auditability

1 Introduction

India's National Strategy for Artificial Intelligence identified research capacity, collaboration, shared infrastructure, and socially useful deployment as policy priorities (NITI Aayog, 2018). The IndiaAI Mission approved in March 2024 added public investment across compute, innovation, datasets, skills, startups, and responsible AI (Press Information Bureau, 2024). These developments make a transparent research baseline useful, but they do not establish that policy caused the publication patterns reported here.

Prior Indian studies report rapid growth in AI publications but different totals and institutional patterns across databases, periods, and search strategies (Shrivastava and Mahajan, 2016; Gupta and Dhawan, 2018; Pandey et al., 2021; Ravichandran and Siva, 2022; Barman, 2025; Mamdapur et al., 2026). Indian Science Reports also demonstrates the value of web-based institutional research mapping (Singh et al., 2022). This paper addresses a narrower measurement problem for a fixed AI-topic pilot cohort. It contributes a frozen work-level extract, an explicit model-assisted rule, auditable institution-year aggregates, a fractional collaboration network, and live-query-churn diagnostics. The paper follows the Leiden Manifesto's emphasis on transparent methods and contextual interpretation rather than producing a league table (Hicks et al., 2015).

Research questions

1. How did publication activity included by the operational AI rule change from 2015 through 2025 within the 25-institution cohort?
2. How was that activity distributed across institution types, and how did concentration change?
3. Did within-cohort collaboration become more common or involve a broader set of institution pairs?
4. How sensitive were the results to document type, score-and-evidence routing, and the AI boundary?

2 Data and methods

2.1 Cohort and observation window

The unit of analysis is an institution-year. The cohort was purposively assembled before outcome analysis and is not a probability sample. Each member had an active Indian ROR record; a one-to-one active OpenAlex institution record carrying the same ROR identifier and country code IN; and at least 200 OpenAlex curated-core works from 2015 to 2025 with a direct institution affiliation and at least one topic assigned to OpenAlex subfield 1702. Ambiguous ROR name matches were manually reviewed before identifiers were frozen, and parent-child lineage expansion was not used. The 200-work rule is a coverage gate, not a quality or capability threshold. The cohort includes broad research universities, technical institutes, specialist computing institutes, and specialist research institutes. Results cannot estimate India's national publication level or institutions outside the cohort.

2.2 Candidate universe and refresh design

The candidate universe was an OpenAlex core-corpus query over the 25 frozen direct institution identifiers, publication years 2015 to 2025, and records with at least one topic assigned to Artificial Intelligence subfield 1702. OpenAlex work identifiers were the deduplication key. This is a frozen OpenAlex-derived query extract, not a snapshot of the full OpenAlex database and not a census of all publications from the 25 institutions. OpenAlex supplies the bibliographic index (Priem et al., 2022), while ROR v2.12 supplies frozen organization identifiers (Research Organization Registry, 2026). Coverage and affiliation disambiguation can materially change institution-level results (Donner et al., 2020; Culbert et al., 2025; Zhang et al., 2024; Mitchell et al., 2026). The exact institution list, query template, retrieval timestamp, and source hashes are preserved with the release.

The v0.2 live-ID set was captured on 29 September 2026 and contains 41,172 unique works and 44,609 institution-work links. It overlaps v0.1 on 39,888 work IDs, adds 1,284 IDs, and excludes 2,860 earlier IDs that no longer appeared under the same live query. For the 39,888 overlapping IDs, v0.2 carries forward the v0.1 bibliographic inputs, Jev outputs, and institution-membership evidence; only the 1,284 new IDs were newly fetched and classified. The release is therefore an ID-set refresh with frozen carried-forward overlap evidence, not a full metadata, affiliation, or model rerun. Query churn may reflect record additions, removals, topic reassignment, affiliation reassignment, or other OpenAlex updates; this study does not decompose those causes.

2.3 Operational model rule

Each record was classified with TypeSafe Jev model typesafe/jev-1.13-20260917 for AI relevance, domain, research orientation, India relevance, and commercialization potential. Jev reports a selected label and an associated choice probability through the TypeSafe API (TypeSafe AI, 2026; accessed 15 October 2026). Throughout this paper, a work is included by the operational primary rule when it is an article or conference paper, its selected AI label is core or adjacent, its Jev-reported selected-label choice probability is at least 0.75, and an abstract is present. This automated rule does not constitute human acceptance or a calibrated probability of correctness. Records meeting the score threshold without an abstract are retained as metadata-limited records; other records remain available for audit but are outside the primary series.

The operational primary series contains 14,714 unique works and 15,980 memberships. The public explorer includes 17,022 works across all work types that pass the same label, score, and abstract rule. The two totals answer different questions and are not interchangeable.

2.4 Internal agreement check

AI-relevance decisions were compared with an 88-record adjudicated reference set assembled during pipeline development. Of those records, 79 are present in the frozen v0.2 snapshot and form the denominator for this check. The reference labels were produced or adjudicated by agents and accepted by the project owner. They are not independent human ground truth, and the set is not used to estimate population-wide error rates or probability calibration.

Agreement measure	Agreements	Result
Exact three-class agreement	73 of 79	92.4%
Agreement with abstract	50 of 52	96.2%
Agreement without abstract	23 of 27	85.2%
Agreement at probability at least 0.75	63 of 65	96.9%

Table 1 Frozen v0.2 internal AI-relevance agreement check. Reference labels are agent-adjudicated and do not constitute independent human validation.

Six of the 79 overlapping records disagreed with the reference labels. Three disagreements crossed the binary AI-relevant versus not-AI boundary; the other three exchanged AI-core and AI-adjacent. At the 0.75 selected-label probability threshold, 65 records were included and 63 agreed with the reference labels. Domain, orientation, India relevance, and commercialization potential were not evaluated against reference labels and are not used to define the primary publication series.

2.5 Counting and network construction

Cohort trends count each OpenAlex work once per year. Institution summaries count a work at most once for each linked cohort institution and year, so membership totals can exceed unique-work totals. Distribution measures use fractional output: a work linked to m cohort institutions contributes 1 divided by m to each institution, following Perianes-Rodriguez et al. (2016). The annual Herfindahl index follows Hall and Tideman (1967) and is the sum of squared fractional-output shares. A leave-one-out series tests whether VIT drives the aggregate concentration pattern. The coauthorship-network construction follows Newman (2001).

The collaboration network uses institutions as nodes and shared primary AI works as edges. Collaboration incidence is the share of unique primary AI works linked to at least two cohort members. Active-pair counts measure breadth. These measures exclude organizations outside the 25-institution cohort.

2.6 Auditability and reproduction boundary

The public Version 1.1 package contains seven aggregate outputs used by the paper, portable verification and reanalysis code, the candidate-query and cohort configuration, a source-release manifest, expected aggregate hashes, a data dictionary, a field-level provenance notice, and package checksums. Any reader can verify the integrity and cross-file consistency of the deposited aggregates. Full record-level recomputation requires an authorised copy of the exact v0.2 analytical inputs identified by SHA-256 hashes; those record-level files are not included in the public-minimal package pending completion of rights and data-minimisation review. Re-running the proprietary Jev service requires authorised credentials, is outside the reproduction claim, and may not return identical labels or probabilities. Integrity checks establish file identity and arithmetic consistency; they do not validate the underlying model labels.

3 Results

3.1 Corpus and measurement yield

Stage	Count	Definition
OpenAlex works	41,172	Frozen v0.2 work-ID snapshot
Institution-work links	44,609	Links across the 25 institutions
Primary works	33,700	Articles and conference papers
Primary works included by the operational rule	14,714	Core or adjacent, probability at least 0.75, abstract present
Primary AI memberships	15,980	One work may link to multiple cohort institutions
Included AI-related works, all types	17,022	Public explorer default
New records in v0.2	1,284	Absent from the frozen v0.1 snapshot
Earlier records no longer returned	2,860	Absent from the same live query

Table 2 Study flow for the frozen v0.2 model-assisted panel.

3.2 Growth within the operational AI rule

Within the OpenAlex AI-subfield candidate universe, article and conference-paper candidates rose from 1,811 in 2015 to 4,768 in 2025, equivalent to 10.2% compound annual growth. The series included by the operational primary rule rose from 659 to 2,338, a 3.55-fold increase and 13.5% annual growth. Its share of the AI-topic-prefiltered primary candidates increased from 36.4% to 49.0%. This comparison does not measure AI's share of all institutional publications, does not establish recall outside the OpenAlex topic filter, and does not measure AI capability.

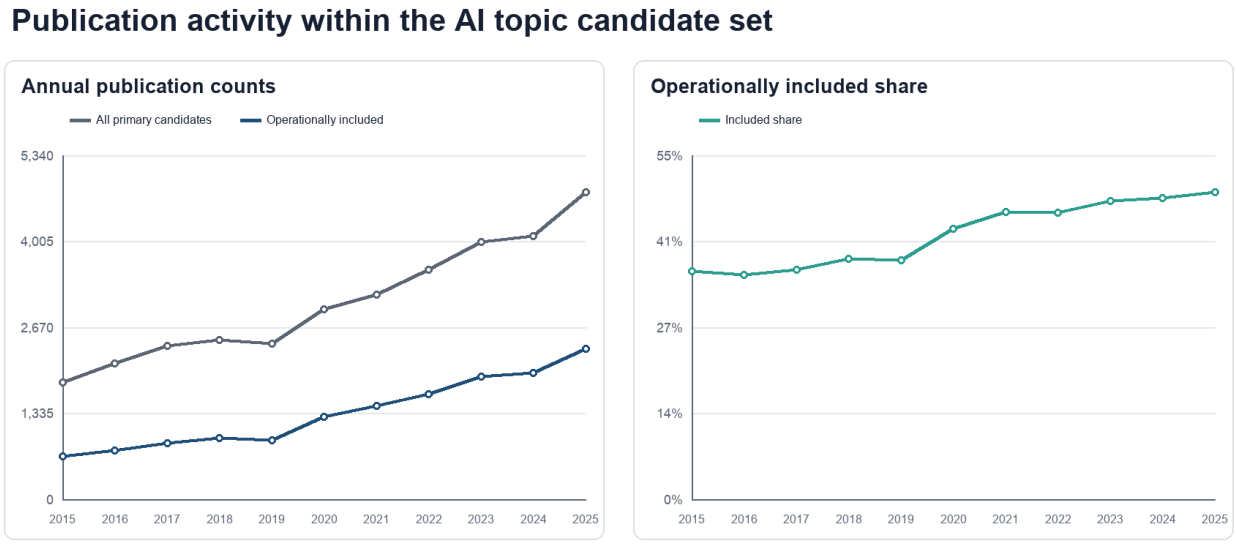


Figure 1 Annual primary candidates and works included by the operational rule within the OpenAlex AI-topic universe. The cohort is fixed and purposive.

3.3 Institution types and concentration

Technical institutes contributed 7,379 primary AI memberships (46.2%); broad research universities contributed 6,955 (43.5%); specialist computing institutes contributed 1,081 (6.8%); and specialist research institutes contributed 565 (3.5%). Unequal stratum sizes and purposive selection prevent population comparisons between institution types.

The five largest fractional contributors accounted for 41.7% of model-attributed output in 2015 and 50.6% in 2025. HHI increased from 0.062 to 0.108. Within this data construction, model-attributed fractional output linked to VIT rose from 8.3% to 28.0%; excluding VIT, HHI fell from 0.065 to 0.058. The aggregate concentration increase is therefore member-specific and sensitive to affiliation and topic assignment. It is not evidence of comparative institutional capability or research quality.

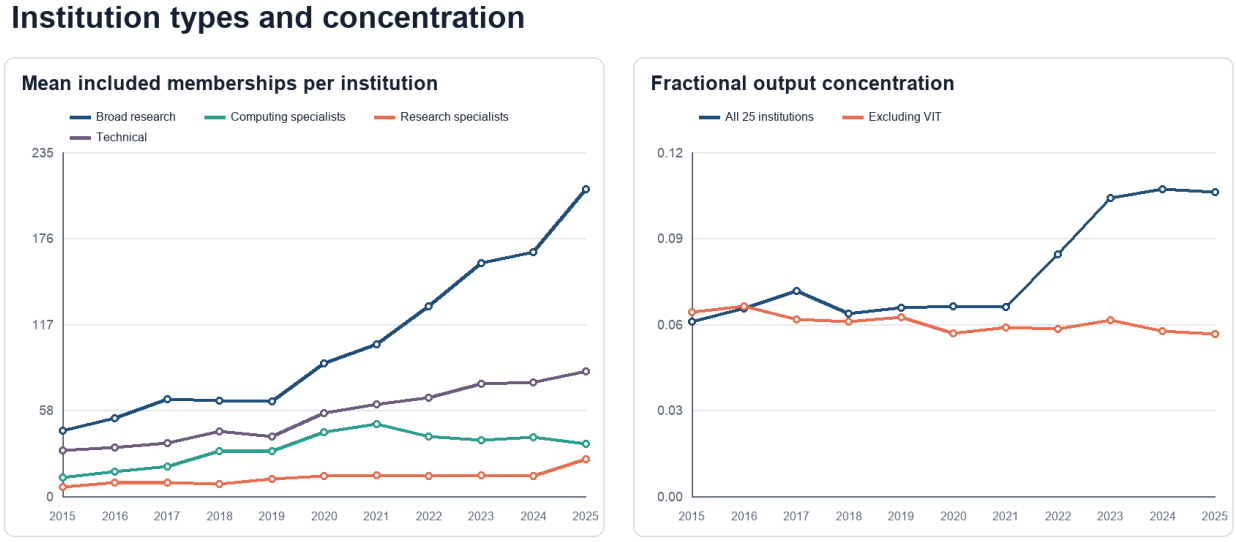


Figure 2 Mean operationally included memberships by cohort stratum and fractional-output concentration. Model-generated; not independently human-validated; not a ranking.

3.4 Collaboration broadened but remained limited

Of 14,714 primary works included by the operational rule, 1,160 (7.9%) linked at least two cohort institutions. The accumulated network contained 198 of 300 possible pairs. Annual collaboration incidence declined from 7.4% in 2015 to 6.3% in 2025, while active pairs increased from 31 to 92. More pairs collaborated, but shared work did not become a larger fraction of the included publication stream.

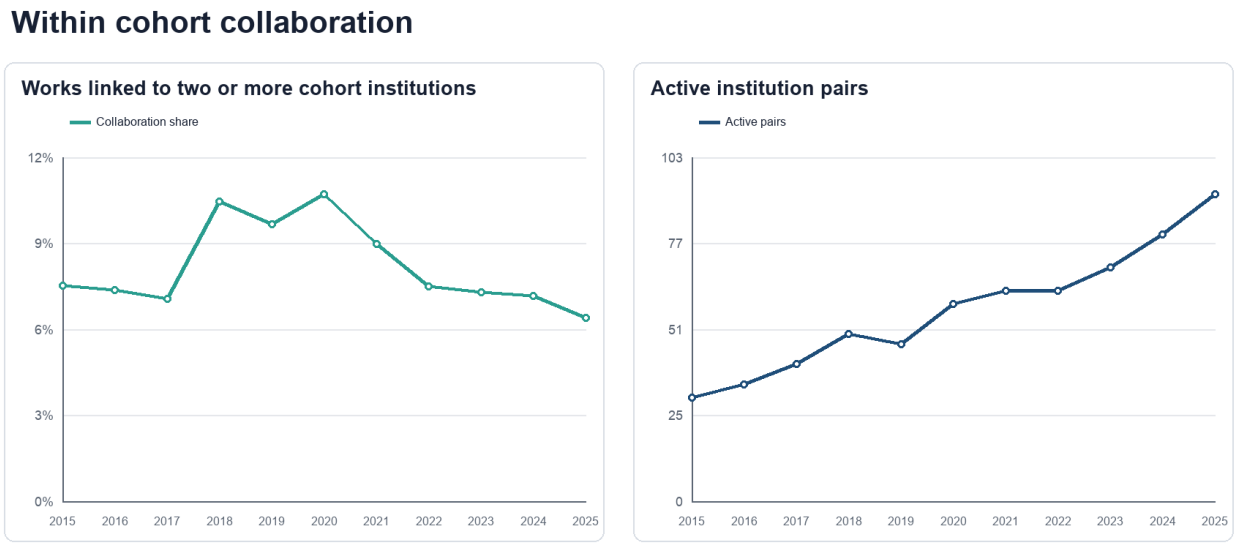


Figure 3 Annual within-cohort collaboration incidence (percent) and active institution pairs within the operational primary series.

3.5 Sensitivity to the analytical boundary

Analysis rule	Unique works	Change	Order correlation
Included core only, primary works	14,415	-2.0%	0.998
Included core plus adjacent, primary works	14,714	+0.0%	1.000
All model-labelled AI, primary works	22,044	+49.8%	0.991
Included AI, all work types	17,022	+15.7%	0.998

Table 3 Sensitivity relative to the 14,714-work operational primary series. Order correlation is Spearman correlation across the 25 institutions. Model-generated; not independently human-validated; not a ranking.

Including AI-adjacent records changes the primary total only modestly. The larger change comes from admitting metadata-limited and lower-score model labels: including every primary work labelled core or adjacent increases the corpus substantially. Adding other document types also increases the total. Score-and-evidence routing and document-type policy are therefore material parts of the result.

4 Discussion

4.1 Findings for the selected cohort

Within the OpenAlex AI-subfield candidate universe, the series included by the operational rule grew faster than the article and conference-paper candidate set. This comparison does not measure the share of AI research in all institutional publications and does not establish recall outside the OpenAlex topic filter. The model-assisted series also shows a wider collaboration network, although shared works remain a small minority. Concentration increased mainly because model-attributed activity linked to one cohort member expanded; excluding that member, fractional output became less concentrated.

These patterns are descriptive. The cohort was selected on an AI-related publication threshold, institution metadata can change, and the internal agreement reference set is not independent human ground truth. The analysis supports an auditable model-assisted baseline rather than a national estimate or institutional ranking.

4.2 Policy interpretation

The panel can support later evaluation of compute access, research programs, datasets, skills initiatives, and funding. It cannot estimate their effects in its present form. Most of the observation window predates the March 2024 IndiaAI Mission, institutions were not randomly assigned to programs, and the cohort selection rule is outcome-related. Any causal study requires a defined intervention, an eligible comparison group, pre-treatment outcomes, and explicit treatment of collaboration spillovers.

4.3 Audit and release design

The v0.1-to-v0.2 comparison shows why each release must freeze source IDs, model outputs, membership evidence, decision thresholds, and hashes. The public explorer displays model status and score-and-evidence

routes beside the records. A later release may add independent blinded review if the project needs externally validated performance estimates or institution-level comparisons. The present paper does not depend on those claims.

5 Limitations

- The purposive 25-institution cohort is not representative of India's research system.
- OpenAlex is an evolving source; 1,284 records entered and 2,860 earlier records left the same query between frozen snapshots.
- The internal agreement check covers only the 79 of 88 agent-adjudicated reference records present in frozen v0.2 and cannot establish independent or population-wide classification validity.
- Only AI relevance was compared with reference labels; the other model-generated fields remain exploratory and do not define the primary series.
- The primary series excludes metadata-limited records, so it favors the specified score and evidence-availability rule over recall.
- Bibliographic inputs, Jev outputs, and membership links for the 39,888 overlapping records retain v0.1 evidence; only the 1,284 new IDs were newly fetched and classified for v0.2.
- Within-cohort collaboration excludes other Indian and international partners.
- The study measures publication activity, not quality, social value, commercialization, capability, or policy effects.

6 Conclusion

Within the defined 25-institution cohort and operational AI boundary, primary publications included by the model rule increased from 659 works in 2015 to 2,338 in 2025. Active institution pairs expanded, but multi-cohort work remained limited. Aggregate concentration increased mainly because of model-attributed activity linked to one cohort member. The source audit found material live-query churn between snapshots, while the v0.2 overlap retained earlier bibliographic, classification, and membership evidence. The study therefore provides an auditable frozen model-assisted baseline: its aggregate calculations, thresholds, source identities, and hashes can be checked, but its work-level labels have not been independently human-validated and its public-minimal package does not permit unauthorised readers to reconstruct every aggregate from record-level rows. Results should not be read as a national estimate, institutional ranking, quality assessment, or causal evaluation.

Data availability and ethics

Version 1.0 of this working paper is deposited at Zenodo (https://doi.org/10.5281/zenodo.23094322), with companion materials at https://doi.org/10.5281/zenodo.23094450. All paper versions are linked by https://doi.org/10.5281/zenodo.23094321 and all package versions by https://doi.org/10.5281/zenodo.23094449. The research explorer is available at https://aiobservatory.in/research-explorer/. The corrected Version 1.1 public-minimal package contains the reported aggregate tables, portable verification and reanalysis code, query and cohort configuration, provenance manifests, and checksums. Exact record-level v0.2 inputs are identified by filename, count, and SHA-256 hash but are not redistributed in the public-minimal package pending final rights and data-minimisation review. An authorised holder of those exact inputs can rerun the aggregate analysis. Re-running Jev requires authorised credentials and is outside the reproduction claim. The study analyzes public bibliographic and organization metadata and reports institution-level aggregates; it does not report person-level outcomes or involve human-subject interventions. Reviewer identities, private correspondence, credentials, and unnecessary personal data are excluded from the public release. This statement does not substitute for a field-level licensing and privacy review of deposited source metadata.

AI and automated-tool disclosure

TypeSafe Jev generated the work-level classifications and reported choice probabilities used in the analysis. OpenAI ChatGPT and Codex assisted with code development, data checking, manuscript drafting and editing, and release preparation. The author reviewed the analysis, citations, interpretations, and final text and remains responsible for all content. No AI system is an author. The labels used for the internal agreement check were generated or adjudicated by AI agents and are not independent human ground truth.

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Declarations

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Competing interests The author is developing the India AI Research Observatory and may benefit reputationally or commercially from its adoption. The author declares no other competing interests.
Author contributions Chintan Dave conceived and directed the project, defined the research and product requirements, reviewed the data and analysis, interpreted the results, and reviewed and approved the manuscript and release. Automated assistance is disclosed above.
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Appendix A Institution by year results

Table A1 reports membership counts for works included by the operational primary rule, in alphabetical order. Each work is counted at most once for an institution and year. Values are model-generated, not independently human-validated, and are not a ranking.

Institution	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Anna University	61	88	64	66	63	75	94	119	135	115	173	1,053
BITS Pilani	21	29	29	39	35	50	90	88	104	99	130	714
CMI	0	0	2	0	1	3	5	11	4	9	27	62
IISc Bengaluru	55	48	59	76	87	104	125	78	101	104	125	962
IISER Pune	0	1	0	0	0	2	4	2	3	5	2	19
IIT BHU	23	17	27	22	20	38	38	33	46	43	56	363
IIT Bombay	47	60	42	72	46	86	96	106	120	117	132	924
IIT Delhi	59	59	56	82	84	110	126	122	152	130	135	1,115
IIT Gandhinagar	5	4	3	3	11	23	17	13	15	23	23	140
IIT Guwahati	32	66	47	40	26	42	37	50	46	72	67	525
IIT Hyderabad	34	39	49	60	69	72	92	110	120	98	101	844
IIT Indore	18	14	9	22	17	25	25	33	29	40	44	276
IIT Kanpur	22	23	34	51	46	60	78	53	69	46	79	561
IIT Kharagpur	63	58	84	86	86	100	112	131	119	151	128	1,118
IIT Madras	29	27	39	48	46	68	74	87	116	106	131	771
IIT Roorkee	43	30	45	40	33	48	50	54	72	81	96	592
IIT Ropar	1	5	3	7	7	9	13	20	19	30	36	150
Indian Statistical Institute	25	35	32	33	44	41	41	39	44	28	52	414
IIIT Delhi	10	16	15	43	56	71	76	60	60	62	53	522
IIIT Bangalore	8	11	14	11	7	17	23	19	30	26	23	189
IIIT Hyderabad	20	24	32	39	29	44	50	43	25	33	31	370
Jadavpur University	53	44	50	59	51	75	52	71	61	59	86	661
TIFR	0	2	3	0	2	9	8	4	7	14	21	70
University of Delhi	23	19	41	18	19	27	33	50	39	66	88	423
VIT	57	94	157	134	134	216	231	376	520	561	662	3,142

Table A1 Institution memberships included by the operational primary rule, 2015 through 2025.