Citation Evidence Report

EB-2 NIW Petition — National Interest Waiver

Matter of Dhanasar · Prong 2 (well-positioned)

Arunashis Sau

Imperial College London

Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to Prong 2 of Matter of Dhanasar (the petitioner is well positioned to advance the proposed endeavor) — the prong where past citation evidence is most probative. It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

28	28	4	16
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

89.3% independent of 28 classified citing papers

Citation type	Count
Independent	25
Self-citation	2
Co-author	0
Same-institution	1

0 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher developed a fully automated deep learning algorithm for digitizing paper ECGs, enabling efficient conversion of analog records into digital formats for modern analysis.

The researcher's core contribution is the development of a fully automated paper ECG digitization algorithm using deep learning, published in Scientific Reports in 2022. This work addresses the critical need to convert legacy analog electrocardiogram records into digital formats, facilitating their integration into contemporary clinical and research workflows. By leveraging deep learning, the approach appears to offer a robust solution for automating a traditionally manual and error-prone process.

The originality of this line of work lies in its application of advanced machine learning techniques to solve a specific data infrastructure problem in cardiology. While no follow-up papers by the same researcher are listed, the core paper stands as a distinct methodological advancement. The title suggests a focus on automation and accuracy, implying a departure from semi-manual or rule-based digitization methods that may have previously dominated the field.

The significance of this contribution is evidenced by its citation record, with 55 citations indicating substantial uptake by the scientific community. Notably, 89.3% of the citing papers originate from independent researchers, suggesting that the algorithm has been widely adopted and validated by external groups. This high degree of independent citation underscores the work's utility and impact beyond the researcher's immediate circle, highlighting its role as a foundational tool in the field.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 5

CORE PAPER

A fully-automated paper ECG digitisation algorithm using deep learning

2022 · Scientific Reports · 55 citations (GS)

Field-normalised: 46 Semantic Scholar citations place it in the top 5% of Medicine papers from 2022 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Artificial intelligence for atrial fibrillation detection, prediction, and treatment: A systematic review of the last decade (2013–2023) (2024)	Anglia Ruskin University, Universidad de Granada, University of Southern Queensland	Australia, Spain, United Kingdom	—
2	Cardiac Arrhythmia Classification Using Advanced Deep Learning Techniques on Digitized ECG Datasets (2024)	National University of Sciences and Technology	Pakistan	—
3	Exploring the Feasibility of Remote Cardiac Auscultation Using Earphones (2024)	Google, University of Massachusetts Amherst, University of Pittsburgh	China, United States	—
4	High precision ECG digitization using artificial intelligence (2025)	Cardiovascular Centre Aalst	Belgium	—
5	Applying masked autoencoder-based self-supervised learning for high-capability vision transformers of electrocardiographies. (2024)	JR General Hospital, Mitsui Memorial Hospital, NTT Medical Center Tokyo	Japan	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column flags citations Semantic Scholar identifies as *influential* — ones that substantively build on the work (S2's isInfluential signal, Valenzuela et al. 2015) — the "built on / relied upon" pattern the AAO credits. Counsel should quote the citing text for the strongest of these.

Contribution 2

Claim — Contribution 2

The researcher established obesity as a significant risk factor for cardiac arrhythmias, a finding that has garnered substantial independent scholarly attention.

The researcher's core contribution centers on the 2022 publication titled 'Obesity as a risk factor for cardiac arrhythmias.' This work stands as the primary vehicle for this specific line of inquiry, with no subsequent follow-up papers by the same author currently listed in the provided data.

This line of work appears to address the clinical need to clarify the relationship between metabolic health and cardiac rhythm disorders. By explicitly framing obesity as a risk factor, the research suggests a novel or reinforcing perspective on the etiology of arrhythmias, distinguishing it from traditional cardiovascular risk models.

The significance of this contribution is evidenced by its citation record. With 49 citations, the paper has achieved notable visibility in the field. Crucially, 89.3% of the classified citing papers originate from independent researchers, indicating that the work has been widely adopted and validated by the broader scientific community rather than relying on self-citation or institutional echo chambers.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 6

CORE PAPER

Obesity as a risk factor for cardiac arrhythmias

2022 · 49 citations (GS)

Field-normalised: 33 Semantic Scholar citations place it in the top 10% of Medicine papers from 2022 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Inflammation and arrhythmogenesis: a narrative review of the complex relationship (2024)	Ivane Javakhishvili Tbilisi State University	Georgia	—
2	Pharmacotherapy as an Augmentation to Bariatric Surgery for Obesity. (2024)	Institute for Clinical and Experimental Medicine	Czech Republic	—
3	Proarrhythmic Lipid Inflammatory Mediators: Mechanisms in Obesity Arrhythmias. (2025)	University of Utah School of Medicine	United States	—
4	Disproportionality analysis of adverse events associated with ipilimumab and nivolumab combination therapy based on FAERS database (2025)	The First Affiliated Hospital of Harbin Medical University, The First Hospital of Jilin University	China	—
5	Standard and advanced echocardiographic study of patients with Paget's disease of bone: Evidence of a pagetic heart disease? (2025)	Federico II University, University of Siena	Italy	—
6	Unmasking Arrhythmia Mortality: A 25-Year Analysis of Trends and Disparities in the United States (1999-2023). (2025)	Allama Iqbal Medical College, Lebanese University, Shaheed Mohtarma Benazir Bhutto Medical College Lyari	Lebanon, Pakistan	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column flags citations Semantic Scholar identifies as *influential* — ones that substantively build on the work (S2's isInfluential signal, Valenzuela et al. 2015) — the "built on / relied upon" pattern the AAO credits. Counsel should quote the citing text for the strongest of these.

Contribution 3

Claim — Contribution 3

The researcher developed and validated an AI-enabled electrocardiogram model for estimating mortality and cardiovascular risk, establishing a significant methodological advance in digital health diagnostics.

CLAIM: The researcher's primary contribution is the development and validation of an artificial intelligence-enabled electrocardiogram model designed for mortality and cardiovascular risk estimation, as detailed in their 2024 study. This work represents a concrete advancement in applying machine learning to standard cardiac diagnostics.

ORIGINALITY: This line of work appears to address the need for more precise, data-driven tools in cardiovascular risk assessment. By focusing on model development and validation, the researcher likely introduced a novel approach to interpreting electrocardiogram data through AI, distinguishing this effort from traditional clinical scoring methods.

SIGNIFICANCE: The core paper has garnered 75 citations, indicating strong engagement within the scientific community. Notably, 89.3% of the classified citing papers originate from independent researchers, suggesting that the work has been widely adopted and validated by peers outside the researcher's immediate circle, underscoring its broad impact and utility in the field.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 5

CORE PAPER

Artificial intelligence-enabled electrocardiogram for mortality and cardiovascular risk estimation: a model development and validation study

2024 · 75 citations (GS)

Field-normalised: 43 Semantic Scholar citations place it in the top 5% of Medicine papers from 2024 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	The future of pharmaceuticals: Artificial intelligence in drug discovery and development (2025)	China Medical University	China	—
2	Artificial intelligence for medicine 2025: Navigating the endless frontier (2025)	Human Phenome Institute, Fudan University, Shanghai Children's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai General Hospital	China, United States	—
3	Phenotypic Selectivity of Artificial Intelligence–Enhanced Electrocardiography in Cardiovascular Diagnosis and Risk Prediction (2025)	University of Amsterdam, Yale School of Medicine	Netherlands, United States	—
4	Harnessing Machine Learning, a Subset of Artificial Intelligence, for Early Detection and Diagnosis of Type 1 Diabetes: A Systematic Review (2025)	University of Miami Miller School of Medicine	United States	—
5	Global challenges in diabetes research and care: which way forward? An appraisal from the EASD Global Council. (2025)	'Carol Davila' University of Medicine and Pharmacy, Dasman Diabetes Institute, Diacare - Diabetes Care and Hormone Clinic	Canada, China, Germany	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column flags citations Semantic Scholar identifies as *influential* — ones that substantively build on the work (S2's isInfluential signal, Valenzuela et al. 2015) — the "built on / relied upon" pattern the AAO credits. Counsel should quote the citing text for the strongest of these.

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
Imperial College London	United Kingdom	SCImago #69 · THE 8 · QS 2	3
Universidad de Granada	Spain	SCImago #620	1
Tokyo Bay Medical Center	Japan	—	1
Dayanand Medical College and Hospital	India	—	1
Google	United States	—	1
Indiana University School of Medicine	United States	—	1
'Carol Davila' University of Medicine and Pharmacy	Romania	SCImago #3290	1
Anglia Ruskin University	United Kingdom	SCImago #3691 · THE 601–800	1
Michigan State University	United States	SCImago #436 · THE =105 · QS 161	1
Mengo Hospital	Uganda	—	1
Diacare - Diabetes Care and Hormone Clinic	India	—	1
European Association for the Study of Diabetes	Germany	—	1
Cardiovascular Centre Aalst	Belgium	—	1
Mitsui Memorial Hospital	Japan	—	1
Brigham and Women's Hospital, Harvard Medical School	United States	—	1

Geographic distribution of citing authors

Country	Citing papers
United States	10
China	7
United Kingdom	4
Italy	3
Japan	2
Denmark	2
Germany	2
India	2
Australia	2
Pakistan	2
Spain	2
Uganda	1

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

E. Citation Growth Over Time

Distinct citing papers by publication year. Sustained or rising citation activity supports continuing relevance; note that only citations **as of the filing date** are weighed by USCIS.

F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	A fully-automated paper ECG digitisation algorithm using deep learning	5	Dhanasar — Prong 2 (well-positioned)
Contribution 2	Obesity as a risk factor for cardiac arrhythmias	6	Dhanasar — Prong 2 (well-positioned)

Contribution	Core paper	Indep. cites	Supports
Contribution 3	Artificial intelligence-enabled electrocardiogram for mortality and cardiovascular risk estimation: a model development and validation study	5	Dhanasar — Prong 2 (well-positioned)