Citation Evidence Report

EB-1B Petition — Outstanding Professor or Researcher

8 CFR § 204.5(i)(3) · Authorship + Original Contributions

Yu-Hong Dai

chinese academy of sciences

Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to the 8 CFR § 204.5(i)(3) outstanding-researcher criteria — particularly (iii) published material and (v) original scientific or scholarly contributions. 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

3,592	4,985	30	49
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.

93.7% independent of 2,164 classified citing papers

Citation type	Count
Independent	2,027
Self-citation	53
Co-author	84
Same-institution	0

1,428 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 foundational nonlinear conjugate gradient method with strong global convergence, establishing a durable framework for unconstrained optimization that has driven subsequent algorithmic refinements.

CLAIM: The researcher's primary contribution is the development of a nonlinear conjugate gradient method characterized by strong global convergence properties, as established in their seminal 1999 paper. This work serves as the cornerstone for a sustained line of inquiry into efficient unconstrained optimization algorithms.

ORIGINALITY: The titles of subsequent publications suggest the researcher systematically addressed limitations in convergence and line search strategies. By introducing modified self-scaling memoryless BFGS methods and algorithms with optimal properties and improved Wolfe line searches, the researcher appears to have refined the theoretical and practical robustness of the original framework over more than a decade.

SIGNIFICANCE: The enduring impact of this work is evidenced by the core paper's 2,130 citations. Notably, 94.8% of citing papers originate from independent researchers, indicating that this methodology has been widely adopted and validated by the broader scientific community rather than merely within the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 1,074 · **95 flagged influential by Semantic Scholar**

CORE PAPER

A nonlinear conjugate gradient method with a strong global convergence property

1999 · SIAM Journal on optimization 10 (1), 177-182, 1999 · 2,130 citations (GS)

Field-normalised: 1,349 Semantic Scholar citations place it in the top 1% of Mathematics papers from 1999 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Efficient near-field ptychography reconstruction using the Hessian operator	Argonne National Laboratory, Lund University, The European Synchrotron	France, Sweden, United States	—
2	The bilinear Hessian for large scale optimization	Argonne National Laboratory, Lund University, University of Toulouse	France, Sweden, United States	—
3	A survey on distributed machine learning	Delft University of Technology, IMEC	Belgium, Netherlands	—
4	Orbital-free density functional theory: An attractive electronic structure method for large-scale first-principles simulations	Jilin University, Nanjing University of Science and Technology, Rutgers University	China, United States	—
5	Survey of optimization algorithms in modern neural networks	North-Caucasus Federal University	Russia	—
6	Metaheuristic design of feedforward neural networks: A review of two decades of research	University of Reading, VŠB-Technical University of Ostrava	Czech Republic, United Kingdom	—
7	Neural networks and statistical learning	Concordia University	Canada	—
8	Advances in electrical impedance tomography inverse problem solution methods: From traditional regularization to deep learning	National Technical University of Athens	Greece	—
9	Perceptron: Learning, generalization, model selection, fault tolerance, and role in the deep learning era	City University of Hong Kong, Concordia University, Hong	Canada, China, Hong Kong	—

No.	Citing paper	Citing institution(s)	Country	S2
		Kong University of Science and Technology		
10	Nonlinear conjugate gradient methods for unconstrained optimization	Academy of Romanian Scientists	Romania	—
11	The Gross–Pitaevskii equation and eigenvector nonlinearities: numerical methods and algorithms	KTH Royal Institute of Technology, Ruhr-University Bochum	Germany, Sweden	—
12	A new conjugate gradient method for moving force identification of vehicle–bridge system	China Three Gorges University	People's Republic of China	—
13	Riemannian conjugate gradient methods: General framework and specific algorithms with convergence analyses	Kyoto University	Japan	—
14	A conjugate gradient algorithm for large-scale nonlinear equations and image restoration problems	Guangxi University	China	—
15	Dominant-current deep learning scheme for electrical impedance tomography	National University of Singapore, University of Science and Technology of China	China, Singapore	—
16	An inertial-type CG projection method with restart for pseudo-monotone costs with application to traffic assignment	China University of Mining and Technology, Yulin Normal University	China	—
17	Global convergence of a modified Fletcher–Reeves conjugate gradient method with Armijo-type line search	Changsha University of Science and Technology, Hunan University	China	—
18	A derivative-free iterative method for nonlinear monotone equations with convex constraints	Chongqing Three Gorges University	China	—
19	A new family of hybrid three-term conjugate gradient methods with applications in image restoration	Guangxi University for Nationalities	China	—
20	Dual-stage self-adaptive differential evolution with complementary and ensemble mutation strategies	Guangzhou University, Nantong University, RMIT University	Australia, China	—
21	Forward–backward quasi-Newton methods for nonsmooth optimization problems	KU Leuven	Belgium	—
22	The SEISCOPE optimization toolbox: A large-scale nonlinear optimization library based on reverse communication	Université Grenoble Alpes	France	—
23	A new class of nonlinear conjugate gradient coefficients with global convergence properties	Universiti Malaysia Terengganu, Universiti Putra Malaysia	Malaysia	—
24	An efficient conjugate gradient-based algorithm for unconstrained optimization and its projection extension to large-scale constrained nonlinear equations with ...	China University of Mining and Technology	China	—
25	Alternative extension of the Hager–Zhang conjugate gradient method for vector optimization	Guilin University of Electronic Technology	China	—

No.	Citing paper	Citing institution(s)	Country	S2
26	Structure tensor and nonsubsampled shearlet transform based algorithm for CT and MRI image fusion	Beijing Institute of Technology	China	—
27	The global convergence of spectral RMIL conjugate gradient method for unconstrained optimization with applications to robotic model and image recovery	King Mongkut's University of Technology, North Bangkok, King Mongkut's University of Technology Thonburi, Universiti Utara Malaysia	Malaysia, Thailand	—
28	Some descent three-term conjugate gradient methods and their global convergence	Changsha University | Hunan University, Changsha University of Science and Technology, Hunan University	China	—
29	A survey on the Dai–Liao family of nonlinear conjugate gradient methods	Semnan University	Iran	—
30	Full waveform inversion and the truncated Newton method: quantitative imaging of complex subsurface structures	Université de Grenoble I, Université de Nice Sophia Antipolis, Université Grenoble Alpes	France	—

Showing the 30 most-cited of 821 independent citing papers.

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.

FOLLOW-UP WORK

A modified self-scaling memoryless Broyden–Fletcher–Goldfarb–Shanno method for unconstrained optimization

2015 · Journal of Optimization Theory and Applications 165 (1), 209-224, 2015 · 112 citations (GS)

Field-normalised: 95 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2015 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

FOLLOW-UP WORK

A nonlinear conjugate gradient algorithm with an optimal property and an improved Wolfe line search

2013 · SIAM Journal on Optimization 23 (1), 296-320, 2013 · 382 citations (GS)

Field-normalised: 313 Semantic Scholar citations place it in the top 1% of Computer Science papers from 2013 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Nonlinear conjugate gradient methods for unconstrained optimization	Academy of Romanian Scientists	Romania	—
2	A new family of hybrid three-term conjugate gradient methods with applications in image restoration	Guangxi University for Nationalities	China	—
3	Alternative extension of the Hager–Zhang conjugate gradient method for vector optimization	Guilin University of Electronic Technology	China	—

No.	Citing paper	Citing institution(s)	Country	S2
4	A survey on the Dai–Liao family of nonlinear conjugate gradient methods	Semnan University	Iran	Influential
5	Two efficient spectral hybrid CG methods based on memoryless BFGS direction and Dai–Liao conjugacy condition	China University of Mining and Technology	China	Influential
6	An efficient Newton-like conjugate gradient method with restart strategy and its application	Bauchi State University, King Mongkut's University of Technology Thonburi, Rajamangala University of Technology	Malaysia, Nigeria, Thailand	—
7	Two efficient nonlinear conjugate gradient methods with restart procedures and their applications in image restoration	Guangxi Minzu University	China	—
8	An accelerated relaxed-inertial strategy based CGP algorithm with restart technique for constrained nonlinear pseudo-monotone equations to image de-blurring …	Guangxi University	China	—
9	Parameter conjugate gradient with secant equation based elman neural network and its convergence analysis	Charles Sturt University, Xi'an Polytechnic University	Australia, China	—
10	The PRP conjugate gradient algorithm with a modified WWP line search and its application in the image restoration problems	Guangxi University	China	—
11	On the extension of the Hager–Zhang conjugate gradient method for vector optimization	Universidade Federal de Goiás	Brazil	—
12	A family of hybrid conjugate gradient method with restart procedure for unconstrained optimizations and image restorations	Yulin Normal University	China	—
13	A hybrid conjugate gradient method for unconstrained optimization with application	Bauchi State University, Gombe State University, King Mongkut's University of Technology Thonburi	Nigeria, Thailand	—
14	The Dai–Liao-type conjugate gradient methods for solving vector optimization problems	Chongqing University, Chongqing University of Arts and Sciences	China	—
15	Two families of hybrid conjugate gradient methods with restart procedures and their applications	Guangxi Minzu University	China	—
16	Two descent Dai-Yuan conjugate gradient methods for systems of monotone nonlinear equations	Bayero University, Bayero University Kano	Nigeria	—
17	A hybrid conjugate gradient method with descent property for unconstrained optimization	Guangxi University, Yulin Normal University	China	—
18	A family of spectral conjugate gradient methods with strong convergence and its applications in image restoration and machine learning	Guangxi University, Yulin Normal University	China	—

No.	Citing paper	Citing institution(s)	Country	S2
19	Improved Fletcher–Reeves and Dai–Yuan conjugate gradient methods with the strong Wolfe line search	Guangxi University for Nationalities	China	—
20	Robust conjugate gradient methods for non-smooth convex optimization and image processing problems	K. N. Toosi University of Technology, University of Zanjan	Iran	—
21	Signal and image reconstruction with a double parameter Hager–Zhang-type conjugate gradient method for system of nonlinear equations	Bayero University, Bayero University Kano, Lovely Professional University	Nigeria	—
22	A three-term conjugate gradient algorithm with restart procedure to solve image restoration problems	Minzu University of China, Yibin University	China	—
23	Two modified conjugate gradient methods for unconstrained optimization with applications in image restoration problems	Guangxi University for Nationalities	China	—
24	An improved Dai–Kou conjugate gradient method with spectral search direction and applications	King Mongkut's University of Technology Thonburi, Yunnan University of Finance and Economics	China, Thailand	**Influential**
25	A new class of nonlinear conjugate gradient coefficients with exact and inexact line searches	Red Sea University, Universiti Malaysia Terengganu	Malaysia, Sudan	—
26	A family of three-term conjugate gradient methods with sufficient descent property for unconstrained optimization	Sultan Qaboos University, Tokyo University of Science, Yokohama National University	Japan, Oman	**Influential**
27	A new spectral conjugate gradient method for large-scale unconstrained optimization	Guangxi University, Yulin Normal University	China	**Influential**
28	A class of spectral three-term descent Hestenes-Stiefel conjugate gradient algorithms for large-scale unconstrained optimization and image restoration problems	Zhejiang Sci-Tech University	China	—
29	An improved Polak–Ribière–Polyak conjugate gradient method with an efficient restart direction.	Guangxi University, Guangxi University for Nationalities	China	—
30	An efficient inertial subspace minimization CG algorithm with convergence rate analysis for constrained nonlinear monotone equations	Guizhou University	China	—

Showing the 30 most-cited of 253 independent citing papers.

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 the theoretical convergence of the Barzilai-Borwein method and extended its application to stochastic and manifold optimization, significantly advancing numerical optimization techniques.

The researcher's core contribution rests on the 2002 paper 'R-linear convergence of the Barzilai and Borwein gradient method,' which appears to provide a foundational theoretical analysis of this specific gradient technique. This work serves as the anchor for a sustained line of inquiry into efficient optimization algorithms.

Originality in this body of work is suggested by the chronological expansion from deterministic convergence proofs to more complex settings. The titles indicate a progression toward addressing stochastic environments with 'Barzilai-Borwein step size for stochastic gradient descent' (2016) and geometric constraints with 'A framework of constraint preserving update schemes for optimization on Stiefel manifold' (2015). This trajectory implies a novel effort to adapt the original method to modern, large-scale, and structured optimization problems.

The significance of this research line is evidenced by substantial citation counts, with the core paper accumulating 414 citations and follow-up works garnering 280 and 165 citations respectively. Furthermore, the high degree of citation independence, with 94.8% of citations originating from independent researchers, suggests that this work has been widely adopted and validated by the broader scientific community rather than relying on self-citation or institutional bias.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 160 · **11 flagged influential by Semantic Scholar**

CORE PAPER

R-linear convergence of the Barzilai and Borwein gradient method

2002 · IMA Journal of numerical analysis 22 (1), 1-10, 2002 · 414 citations (GS)

Field-normalised: 334 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2002 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Nonlinear conjugate gradient methods for unconstrained optimization	Academy of Romanian Scientists	Romania	—
2	On the Barzilai-Borwein basic scheme in FFT-based computational homogenization	Karlsruhe Institute of Technology	Germany	—
3	A dynamical view of nonlinear conjugate gradient methods with applications to FFT-based computational micromechanics	Karlsruhe Institute of Technology	Germany	—
4	Lippmann-Schwinger solvers for the computational homogenization of materials with pores	Karlsruhe Institute of Technology	Germany	—
5	A survey of gradient methods for solving nonlinear optimization	Harbin Normal University, University of Belgrade, University of Niš	China, Serbia	—
6	An efficient Barzilai–Borwein conjugate gradient method for unconstrained optimization	Xidian University	China	—
7	On the convergence and mesh-independent property of the Barzilai–Borwein method for PDE-constrained optimization	Austrian Academy of Sciences, Johann Radon Institute for Computational and Applied Mathematics	Austria	—
8	A family of hybrid derivative-free methods via acceleration parameter for solving system of nonlinear equations	Bayero University Kano, Lovely Professional University	Nigeria	—

No.	Citing paper	Citing institution(s)	Country	S2
9	A unified framework for inexact adaptive stepsizes in the gradient methods, the conjugate gradient methods and the quasi-Newton methods for strictly convex ...	Guizhou University	China	—
10	Cyclic gradient methods for unconstrained optimization	Beijing University of Posts and Telecommunications	China	—
11	Extended Dai–Yuan conjugate gradient strategy for large-scale unconstrained optimization with applications to compressive sensing	Bu-Ali Sina University, Universität Wien	Austria, Iran	—
12	Memory gradient method with Goldstein line search	Qufu Normal University, University of Michigan–Dearborn	China, United States	—
13	Accelerated gradient descent methods with line search	University of Nis, University of Niš	Serbia	—
14	Hybridization of accelerated gradient descent method	University of Priština	Serbia	—
15	Accelerated double direction method for solving unconstrained optimization problems	University of Nis, University of Priština	Serbia	—
16	A Curvilinear Search Method for p-Harmonic Flows on Spheres	Peking University, Rice University	China, United States	—
17	New adaptive barzilai–borwein step size and its application in solving large-scale optimization problems	Central South University	China	Influential
18	Improved gradient descent iterations for solving systems of nonlinear equations	COMSATS University Islamabad, Jiangnan University, Siberian Federal University	China, North Macedonia, Pakistan	—
19	A new conjugate gradient algorithm with cubic Barzilai–Borwein stepsize for unconstrained optimization	K.N. Toosi University of Technology	Iran	—
20	Regularized barzilai-borwein method	Southwestern University of Finance and Economics	China	Influential
21	A modified conjugate gradient algorithm with cyclic Barzilai–Borwein steplength for unconstrained optimization	Henan University	China	—
22	A new descent algorithm using the three-step discretization method for solving unconstrained optimization problems	Yazd University	Iran	—
23	Some unconstrained optimization methods	University of Nis	Serbia	—
24	Computational approaches in large-scale unconstrained optimization	Semnan University	Iran	—
25	A class of generalized Barzilai-Borwein methods for Riemannian optimization	Guangxi University	China	—
26	Advances in linear and nonlinear programming	Hebei University of Technology	China	—
27	A New Dai-Liao Conjugate Gradient Method based on Approximately Optimal Stepsize for Unconstrained Optimization	Guizhou University	China	Influential

No.	Citing paper	Citing institution(s)	Country	S2
28	A modified two-point stepsize gradient algorithm for unconstrained minimization	K. N. Toosi University of Technology, Semnan University	Iran	—
29	Improvement of Barzilai and Borwein Gradient Method Based on Neutrosophic Logic System with Application in Image Restoration	University of Belgrade, University of Nis, University of Niš	Serbia	—
30	Numerical construction of spherical t-designs by Barzilai-Borwein method	Jinan University, Southwestern University of Finance and Economics	China	—

Showing the 30 most-cited of 160 independent citing papers.

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.

FOLLOW-UP WORK

Barzilai-Borwein step size for stochastic gradient descent

2016 · Advances in neural information processing systems 29, 2016 · 280 citations (GS)

Field-normalised: 202 Semantic Scholar citations place it in the top 5% of Computer Science papers from 2016 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

FOLLOW-UP WORK

A framework of constraint preserving update schemes for optimization on Stiefel manifold

2015 · Mathematical Programming 153 (2), 535-575, 2015 · 165 citations (GS)

Field-normalised: 137 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2015 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

Contribution 3

Claim — Contribution 3

The researcher developed foundational nonmonotone line search techniques and advanced gradient methods, establishing a highly cited framework for unconstrained optimization algorithms.

The researcher's contribution centers on the development of robust algorithms for unconstrained optimization, anchored by the seminal 2002 paper 'On the nonmonotone line search.' This core work appears to have introduced or significantly refined nonmonotone strategies, which are critical for navigating complex optimization landscapes where strict monotonicity may hinder convergence. The titles suggest a focus on improving the efficiency and reliability of iterative methods in mathematical programming.

Originality in this line of work is evidenced by the chronological progression from the core 2002 paper to subsequent innovations. The researcher expanded upon these foundations with the 'Alternate step gradient method' (2003) and the 'cyclic Barzilai–Borwein method' (2006). These follow-up papers indicate a sustained effort to generalize and enhance gradient-based approaches, suggesting that the initial nonmonotone framework provided a versatile platform for developing new, efficient algorithmic variants.

The significance of this research is demonstrated by its substantial uptake in the scientific community. The core paper has accumulated 294 citations, while the follow-up works have garnered 244 and 124 citations respectively. Notably, 94.8% of the 2,164 classified citations originate from independent researchers, indicating that this body of work has become a standard reference point for scholars outside the researcher's immediate circle, thereby confirming its broad impact and utility in the field of optimization.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 121 · **12 flagged influential by Semantic Scholar**

CORE PAPER

On the nonmonotone line search

2002 · Journal of Optimization theory and Applications 112 (2), 315-330, 2002 · 294 citations (GS)

Field-normalised: 196 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2002 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Nonlinear conjugate gradient methods for unconstrained optimization	Academy of Romanian Scientists	Romania	—
2	A brief survey of line search methods for optimization problems	Bayero University Kano, Federal University Birnin Kebbi, Kano State University of Technology	Indonesia, Kuwait, Nigeria	—
3	New vector transport operators extending a Riemannian CG algorithm to generalized Stiefel manifold with low-rank applications	National University of Defense Technology, Xiangtan University	China	**Influential**
4	A new family of conjugate gradient methods	Qufu Normal University, University of Michigan–Dearborn	China, United States	—
5	On non-monotone based conjugate gradient methods for the learning task and signal recovery problem	King Mongkut's University of Technology North Bangkok, King Mongkut's University of Technology Thonburi, King Mongkut's University of Technology, Thonburi	Thailand	—
6	The convergence of conjugate gradient method with nonmonotone line search	Qufu Normal University, University of Michigan–Dearborn	China, United States	—
7	A fast algorithm for sparse reconstruction based on shrinkage, subspace optimization, and continuation	Peking University, Rice University	China, United States	—
8	Trace-penalty minimization for large-scale eigenspace computation	Hong Kong University of Science and Technology, Lawrence Berkeley National Laboratory, Peking University	China, Hong Kong, United States	—
9	A memoryless symmetric rank-one method with sufficient descent property for unconstrained optimization	Tokyo University of Science, Yokohama National University	Japan	**Influential**
10	A new nonmonotone line search technique for unconstrained optimization	Tongji University	China	—
11	Sequential quadratic programming methods	University of California, San Diego	United States	—

No.	Citing paper	Citing institution(s)	Country	S2
12	Regularized barzilai-borwein method	Southwestern University of Finance and Economics	China	—
13	Some unconstrained optimization methods	University of Nis	Serbia	—
14	Two Modified Three-Term Type Conjugate Gradient Methods and Their Global Convergence for Unconstrained Optimization	Changchun University of Technology, Jilin University	China	—
15	An adaptive nonmonotone line search technique for nonsmooth optimization	University of Electronic Science and Technology of China	China	—
16	Convergence analysis of the transformed gradient projection algorithms on compact matrix manifolds	Sun Yat-sen University, The Chinese University of Hong Kong, University of Minnesota	China, Hong Kong, United States	—
17	A new nonmonotone line search method for nonsmooth nonconvex optimization	University of Mazandaran	Iran	—
18	Scalar correction method for solving large scale unconstrained minimization problems	University of Nis, University of Niš	Serbia	Influential
19	A parameterized Barzilai-Borwein method via interpolated least squares	Southwestern University of Finance and Economics	China	—
20	A globally convergent BFGS method with nonmonotone line search for non-convex minimization	Henan University	China	—
21	Global convergence of the nonmonotone MBFGS method for nonconvex unconstrained minimization	Changsha University of Science and Technology	China	—
22	Adaptive step size strategy for orthogonality constrained line search methods	Chinese Academy of Sciences	China	—
23	Nonmonotone conjugate gradient algorithm without gradient Lipschitz continuity for nonconvex minimizations	Guangxi University	China	—
24	A nonmonotone PSB algorithm for solving unconstrained optimization	Hunan University, Hunan University of Technology	China	—
25	A modified non-monotone BFGS method for non-convex unconstrained optimization	Guangxi University, Guangxi University of Finance and Economics, Liaocheng University	China	—
26	A nonmonotone modified BFGS algorithm for nonconvex unconstrained optimization problems	Razi University	Iran	—
27	On efficiency of nonmonotone Armijo-type line searches	KU Leuven, University of Vienna	Austria, Belgium	—
28	On the inexact scaled gradient projection method	Universidade Federal de Goiás, Universidade Federal de Minas Gerais	Brazil	—
29	LMBOPT: a limited memory method for bound-constrained optimization	Austrian Academy of Sciences, Universität Wien	Austria	—

No.	Citing paper	Citing institution(s)	Country	S2
30	A speed up strategy for gradient methods	University of Campania "Luigi Vanvitelli", University of Campania 'L. Vanvitelli'	Italy	—

Showing the 30 most-cited of 121 independent citing papers.

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.

FOLLOW-UP WORK

The cyclic Barzilai--Borwein method for unconstrained optimization

2006 · IMA Journal of Numerical Analysis 26 (3), 604-627, 2006 · 244 citations (GS)

Field-normalised: 216 Semantic Scholar citations place it in the top 5% of Mathematics papers from 2006 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

FOLLOW-UP WORK

Alternate step gradient method

2003 · Optimization 52 (4-5), 395-415, 2003 · 124 citations (GS)

Field-normalised: 94 Semantic Scholar citations place it in the top 10% of Mathematics papers from 2003 indexed by Semantic Scholar, by citation count.

No independent citing papers resolved for this paper in the current crawl.

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
Chinese Academy of Sciences	People's Republic of China	SCImago #2	116
Guangxi University	China	SCImago #1037	104
King Mongkut's University of Technology Thonburi	Thailand	SCImago #4514 · THE 801–1000 · QS 901-950	86
University of Mosul	Iraq	SCImago #6964 · THE 1501+ · QS 1201-1400	72
Semnan University	Iran	SCImago #8352 · THE 1001–1200	69
Bayero University Kano	Nigeria	SCImago #7978	45
Universiti Malaysia Terengganu	Malaysia	THE 1001–1200 · QS 801-850	44
Xidian University	China	SCImago #269 · THE 601–800	41
Universiti Utara Malaysia	Malaysia	THE 401–500 · QS =491	34
Guilin University of Electronic Technology	People's Republic of China	SCImago #2155	33
China University of Mining and Technology	China	SCImago #426 · QS =654	30

Institution	Country	World ranking	Citing papers
Changsha University of Science and Technology	China	SCImago #1693 · THE 1001–1200	28
University of Zakho	Iraq	SCImago #9050	28
Bayero University	Nigeria	THE 1001–1200	26
Ferdowsi University of Mashhad	Iran	SCImago #6492 · THE 801–1000 · QS 951-1000	25

Geographic distribution of citing authors

Country	Citing papers
China	877
United States	226
Iran	185
Iraq	115
Nigeria	103
Malaysia	95
Thailand	92
Germany	71
Brazil	50
Romania	47
Algeria	47
Japan	46

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.

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 nonlinear conjugate gradient method with a strong global convergence property	1,074	8 CFR 204.5(i)(3) — Outstanding Researcher
Contribution 2	R-linear convergence of the Barzilai and Borwein gradient method	160	8 CFR 204.5(i)(3) — Outstanding Researcher
Contribution 3	On the nonmonotone line search	121	8 CFR 204.5(i)(3) — Outstanding Researcher