

Geographic search filters for embase.com interface: An analysis utilizing multiple case studies

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Background

Systematic literature reviews are time-consuming, expensive, and require extensive research. Managing the studies captured in systematic reviews while ensuring comprehensiveness is important. Using search filters is an efficient way to manage the number of citations to be screened. Search filters are collections of search terms designed to retrieve studies with the search terms/concepts in bibliographic databases, e.g., Embase and PubMed. Search filters aim to retrieve relevant search results with a good balance of recall and precision. Recall is the proportion of known relevant citations retrieved by a search filter, and precision is the proportion of citations retrieved by a filter that are relevant. Number needed-to-screen (NNS) may be used to measure search efficiency as an alternative to precision. NNS is the number of citations that must be screened to retrieve each relevant citation. By reducing NNS, filters can potentially save time and associated resource costs spent on selecting relevant evidence for research topics by reducing search result numbers.

A geographic search filter is designed to retrieve research with a common geographic location. Geographic-specific evidence is sometimes required to inform context-sensitive recommendations, e.g., UK (United Kingdom) evidence for NICE (National Institute for Health and Care Excellence) and US (United States)-specific content for AMCP (Academy for Managed Care Pharmacy) dossiers. However, developing a geographic search filter is challenging as geography is not always reported in titles or abstracts. In addition, geographic locations are often not indexed in bibliographic databases.

- Objective** – To develop validated geographic search filters to retrieve research about the UK and the US from the embase.com interface.

Methods

STEP 1 (Develop search filters): We created two geography search filters (specific to the UK and the US) and tested their performance against completed literature reviews. In line with best practice for identifying evidence for systematic reviews, Embase was searched alongside MEDLINE in our literature searches from the embase.com interface. The search filters were made up of the following search fields and search terms:

- Search fields:** Emtree headings, titles, abstracts, journal words, keywords, author addresses, and author countries.
- Search terms:** UK countries, keywords, states, major cities, nationalities, FDA (Food and Drug Administration), and NHS (National Health Service).

STEP 2 (Validation of search filters): A standard set of known relevant references was utilized for validating the search filters. We identified ten evidence-based reviews (n=5 each for the US and UK) using the following inclusion criteria:

- The review should be based on US or UK-specific references or
- Clearly label US or UK-specific references if the review is based on an international set of references
- The search strategies used for the reviews must not include a geographic search filter to prevent bias by having pre-restricted US/UK references
- The selection of reviews had a broad range of healthcare topics, e.g., epidemiology, quality of life, patterns, and study designs.

We validated the search filters by calculating the following parameters:

- Recall:** Number of relevant citations retrieved by filter/total number of relevant citations
- NNS:** Number of citations that must be screened to retrieve every relevant citation (1/precision); Precision: Number of relevant citations retrieved by filter/ Total number of citations

Filter developed for the US

'united states'/exp OR 'united state'' OR 'appalachian region' OR 'Confederate States of America' OR 'great lakes region' OR 'mid-atlantic region' OR 'midwestern united states' OR 'new England' OR 'northwestern united states' OR 'pacific states' OR 'southeastern united states' OR 'southwestern united states' OR 'U.S.' OR 'U.S.A.' OR 'United States of America' OR 'USA' OR 'United States' OR 'food and drug administration'/exp OR 'fda' OR 'united states food and drug administration' OR 'us fda' OR 'us food and drug administration' OR 'food and drug administration' OR 'Los Angeles' OR 'San Francisco' OR 'Chicago' OR 'Illinois' OR 'New Orleans' OR 'Baltimore' OR 'Boston'

US contd.

'United Mexican States' OR 'United States of Mexico' OR 'New York City' OR 'Philadelphia' OR 'Carolina' OR 'Dakota' OR Virginia OR ('California' OR 'Illinois' OR 'Washington' OR 'Wisconsin' OR 'Wyoming' OR 'Ohio' OR 'Oklahoma' OR 'Oregon' OR 'Rhode Island' OR 'Tennessee' OR 'Texas' OR 'Utah' OR 'Vermont' OR 'West Virginia' OR 'North Dakota' OR 'South Dakota' OR 'Alabama' OR 'Alaska' OR 'Arizona' OR 'Arkansas' OR 'Colorado' OR 'Connecticut' OR 'Delaware' OR 'Florida' OR 'Georgia' OR 'Georgia (U.S.)' OR 'Hawaii' OR 'Idaho' OR 'Indiana' OR 'Iowa' OR 'Kansas' OR 'Kentucky' OR 'Maine' OR 'Michigan' OR 'Minnesota' OR 'Mississippi' OR 'Missouri' OR 'Montana' OR 'Nebraska' OR 'Nevada' OR 'New Hampshire' OR 'New Jersey' OR 'North Carolina' OR 'South Carolina' OR 'Pennsylvania' OR 'New York' OR 'Mexico' OR 'Massachusetts' OR 'Maryland' OR 'Louisiana')/exp OR 'Annapolis' OR 'Atlanta' OR 'Austin' OR 'Charleston' OR 'Cheyenne' OR 'Columbia' OR 'Columbus' OR 'Concord' OR 'Denver' OR 'Indianapolis' OR 'Lincoln' OR 'Pierre' OR 'Saint Paul' OR 'Santa Fe' OR 'Trenton' OR 'Houston' OR 'Phoenix' OR 'San Antonio' OR 'San Diego' OR 'Dallas' OR 'San Jose' OR 'Seattle' OR 'Portland' OR 'Las Vegas' OR 'Miami' OR 'Nashville' OR 'Detroit' OR 'Jacksonville' OR 'Fort worth' OR 'Charlotte' OR 'Oklahoma city' OR 'El Paso' OR 'Memphis' OR 'Louisville' OR 'Milwaukee' OR 'Albuquerque' OR 'Tucson' OR 'Fresno' OR 'Sacramento' OR 'Kansas city' OR 'Mesa' OR 'Atlanta' OR 'Omaha' OR 'Colorado springs' OR 'Raleigh' OR 'Long beach' OR 'Virginia beach' OR 'Oakland' OR 'Minneapolis' OR 'Tulsa' OR 'Bakersfield' OR 'Wichita' OR 'Arlington' OR 'united state'' OR 'appalachian region' OR 'confederate states of america' OR 'great lakes region' OR 'mid-atlantic region' OR 'midwestern united states' OR 'new england' OR 'northwestern united states' OR 'pacific states' OR 'southeastern united states' OR 'southwestern united states' OR 'u.s.' OR 'u.s.a.' OR 'united states of america' OR 'usa' OR 'united states' OR 'fda' OR 'united states food and drug administration' OR 'us fda' OR 'us food and drug administration' OR 'food and drug administration' OR 'california' OR 'los angeles' OR 'san francisco' OR 'chicago' OR 'illinois' OR 'louisiana' OR 'new orleans' OR 'maryland' OR 'annapolis' OR 'massachusetts' OR 'boston' OR 'mexico' OR 'united mexican states' OR 'united states of mexico' OR 'new york' OR 'new york city' OR 'pennsylvania' OR 'philadelphia' OR 'alabama' OR 'alaska' OR 'arizona' OR 'arkansas' OR 'colorado' OR 'connecticut' OR 'delaware' OR 'florida' OR 'georgia' OR 'georgia (u.s.)' OR 'hawaii' OR 'idaho' OR 'indiana' OR 'iowa' OR 'kansas' OR 'kentucky' OR 'maine' OR 'michigan' OR 'minnesota' OR 'mississippi' OR 'missouri' OR 'montana' OR 'nebraska' OR 'nevada' OR 'new hampshire' OR 'new jersey' OR 'north carolina' OR 'south carolina' OR 'carolina' OR 'north dakota' OR 'south dakota' OR 'dakota' OR 'ohio' OR 'oklahoma' OR 'oregon' OR 'rhode island' OR 'tennessee' OR 'texas' OR 'utah' OR 'vermont' OR 'west virginia' OR 'virginia' OR 'washington' OR 'wisconsin' OR 'wyoming' OR 'annapolis' OR 'austin' OR 'charleston' OR 'cheyenne' OR 'columbia' OR 'columbus' OR 'concord' OR 'denver' OR 'indianapolis' OR 'lincoln' OR 'pierre' OR 'saint paul' OR 'santa fe' OR 'trenton' OR 'houston' OR 'phoenix' OR 'san antonio' OR 'san diego' OR 'dallas' OR 'san jose' OR 'seattle' OR 'portland' OR 'las vegas' OR 'miami' OR 'nashville' OR 'detroit' OR 'jacksonville' OR 'fort worth' OR 'charlotte' OR 'oklahoma city' OR 'ei paso' OR 'memphis' OR 'louisville' OR 'milwaukee' OR 'albuquerque' OR 'lucson' OR 'fresno' OR 'sacramento' OR 'kansas city' OR 'mesa' OR 'atlanta' OR 'omaha' OR 'colorado springs' OR 'raleigh' OR 'long beach' OR 'virginia beach' OR 'oakland' OR 'minneapolis' OR 'tulsa' OR 'bakersfield' OR 'wichita' OR 'arlington')':ti,ab,kw,ad,ca

Filter developed for the UK

'united kingdom'/exp OR 'uk' OR 'united kingdom of great britain and northern ireland' OR 'united kingdom' OR 'national health service'/exp OR 'national service corps' OR 'socialised medicine' OR 'socialized medicine' OR 'state medicine' OR 'national health service' OR ('national health service'' OR 'nhs''):ti,ab OR (((gb OR 'g.b.' OR britain* OR british* OR uk OR 'u.k.' OR united) AND kingdom* OR england* OR northern) AND ireland* OR northern) OR irish* OR scotland* OR scottish* OR wales OR 'south wales' OR 'wales' OR bath OR birmingham OR bradford OR brighton OR bristol OR carlisle* OR cambridge OR canterbury OR chelmsford OR chester OR chichester OR coventry OR derby OR durham OR ely OR exeter OR Gloucester OR hereford OR hull OR lancaster OR leeds* OR leicester OR lincoln OR liverpool OR london OR manchester OR newcastle OR norwich OR nottingham OR oxford OR peterborough OR plymouth OR portsmouth OR preston OR ripon OR salford OR Salisbury OR sheffield OR southampton OR 'st albans' OR stoke OR sunderland OR truro OR wakefield OR wells OR Westminster OR Winchester OR Wolverhampton OR Worcester OR york OR bangor OR cardiff OR Newport OR 'st asaph' OR 'st davids' OR swansea OR 'wrexham' OR 'barry' OR 'neath' OR 'cwmbran' OR 'bridgend' OR 'llanelli' OR 'merthyr tydfil' OR aberdeen OR dundee OR edinburgh OR glasgow OR inverness OR perth OR stirling OR 'paisley' OR 'east kilbride' OR 'livingston' OR 'hamilton' OR 'cumbernauld' OR 'kirkcaldy' OR armagh OR belfast OR lisburn OR Londonderry OR derry OR Newry OR 'west midlands' OR 'west yorkshire' OR 'south hampshire' OR 'tyneside' OR 'greater craigavon' OR 'newtownabbey' OR 'ballymena' OR 'newtownards' OR 'carrickfergus' OR 'greater london' OR ('uk' OR 'united kingdom of great britain and northern ireland' OR 'united kingdom' OR 'national service corps' OR 'socialised medicine' OR 'socialized medicine' OR 'state medicine' OR 'national health service' OR 'national health service'' OR 'nhs' OR (((gb OR 'g.b.' OR britain* OR british* OR uk OR 'u.k.' OR united) AND kingdom* OR england* OR northern) AND ireland*) OR northern) AND irish* OR scotland* OR scottish* OR wales OR 'south wales' OR 'wales' OR bath OR birmingham OR bradford OR brighton OR bristol OR carlisle* OR cambridge OR canterbury OR chelmsford OR chester OR chichester OR heffield OR derby OR durham OR ely OR exeter OR Gloucester OR hereford OR hull OR lancaster OR leeds* OR leicester OR lincoln OR liverpool OR london OR manchester OR newcastle OR norwich OR nottingham OR oxford OR peterborough OR plymouth OR portsmouth OR preston OR ripon OR salford OR Salisbury OR heffield OR southampton OR 'st albans' OR stoke OR sunderland OR truro OR wakefield OR wells OR Westminster OR Winchester OR Wolverhampton OR Worcester OR york OR bangor OR cardiff OR Newport OR 'st asaph' OR 'st davids' OR swansea OR 'wrexham' OR 'barry' OR 'neath' OR 'cwmbran' OR 'bridgend' OR 'llanelli' OR 'merthyr tydfil' OR aberdeen OR dundee OR edinburgh OR glasgow OR inverness OR perth OR stirling OR 'paisley' OR 'east kilbride' OR 'livingston' OR 'hamilton' OR 'cumbernauld' OR 'kirkcaldy' OR armagh OR belfast OR lisburn OR Londonderry OR derry OR Newry OR 'west midlands' OR 'west yorkshire' OR 'south hampshire' OR 'tyneside' OR 'greater craigavon' OR 'newtownabbey' OR 'ballymena' OR 'newtownards' OR 'carrickfergus' OR 'greater london')':ti,ab,kw,ca,ad

Results

- The US filter was tested against five reviews. It demonstrated an average of 97.77% recall for the included US citations. One citation was missed, as our filter did not have SEER as an identifier. The average NNS reduced from 200 to 97. The total citations were reduced by an average of 46.63% (32,271 to 17,222).
- Similarly, the output of the UK filter was compared to five reviews and resulted in an average recall of 100% with no UK-specific citations missed with our filter. The average NNS reduced from 44 to 23. The total citations were reduced by an average of 59.77% (31,722 to 12,759).

Conclusion

The filters demonstrated high recall, reduced NNS, and decreased the screening workload of titles/abstracts by ~50%. They can be utilized to retrieve US and UK-specific evidence. Systematic literature searches result in volumes that can increase the time spent on evidence selection for research topics. Using the filters should, therefore, save time and associated resources for research topics with a US and UK focus.

Details of the validation parameters

Cancer type	Search Parameter	Original citations before applying country filter	Updated citations after applying country filter	% reduction in citations	Recall	Precision
US						
HNC	Humanistic	5,137	2,877	2,260 (56.01%)	34/34	34/(5,137 vs. 2,877)
HNC	Epidemiology	4,434	2,291	2,143 (51.67%)	16/16	16/(4,434 vs. 2,291)
HCC	Multiple	9,795	5,161	4,634 (52.69%)	35/35	35/(9,795 vs. 5,161)
NSCLC	Treatment pattern	12,189	6,578	5,611 (53.97%)	5/5	5/(12,189 vs. 6,578)
Cervical	Epidemiology	716	315	401 (56%)	8/9	8/(716 vs. 315)
UK						
Multiple	Multiple	20,600	8,817	11,783 (42.8%)	62/62	62/(20,600 vs. 8,817)
HNC	Humanistic	5,137	1,716	3,421 (33.4%)	5/5	5/(5,137 vs. 1,716)
HNC	Epidemiology	4,434	1,574	2,860 (35.5%)	8/8	8/(4,434 vs. 1,574)
Lung	Epidemiology	1,263	497	766 (39.37%)	8/8	8/(1,263 vs. 497)
Multiple	Multiple	288	155	133 (52.82%)	29/29	29/(288 vs. 155)

HCC: Hepatocellular carcinoma; HNC: Head and neck cancer; NSCLC: Non-small cell lung cancer