

An overview of EMERSE, an easy-to-use, self-service search engine and chart review tool for free text electronic health record documents

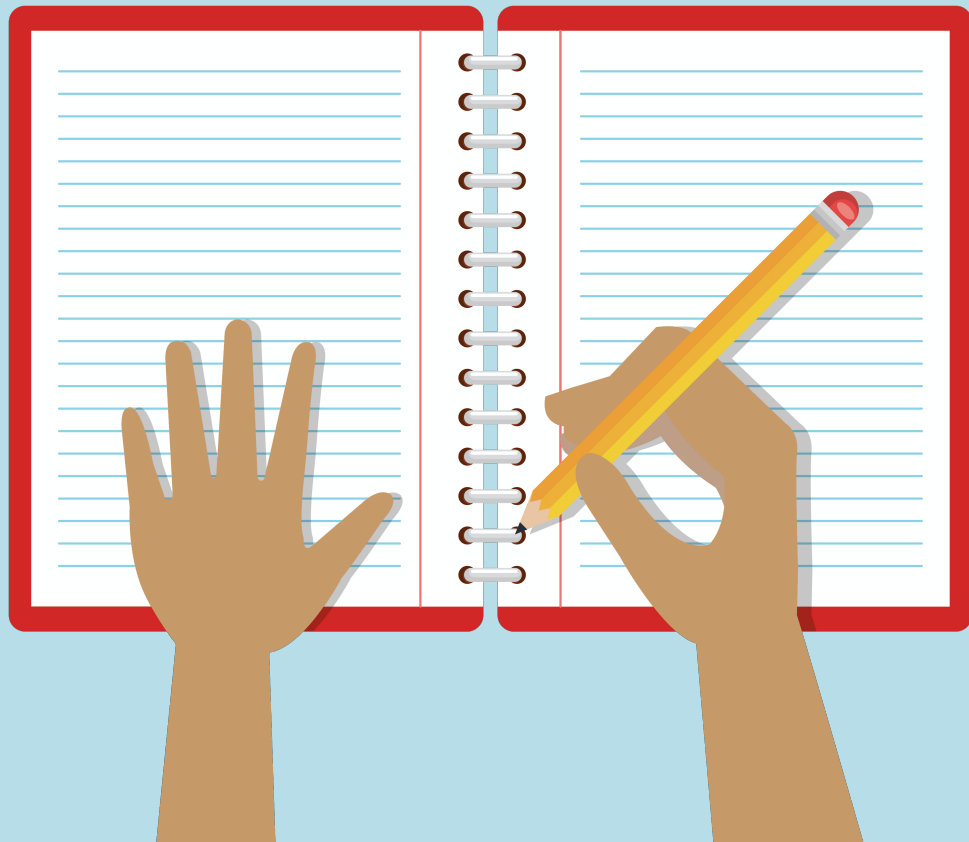


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If you're thinking of taking notes or want to visit links



these slides can be found at:

this link will be
on most slides



em**rse**
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

<http://project-emerse.org/presentations.html>

Disclosures

Funding: NIH (NCI, NCATS); PCORI

Licenses/Royalties: EMERSE “Synonyms”
(used for query expansion) which is
licensed by the U of Michigan



The Problem(s)

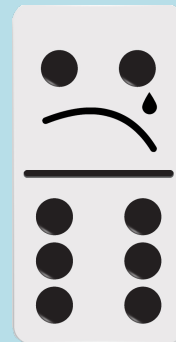
Free text is: complex



it's a
representation
of the mind

The Problem(s)

Free text is: a mess



“domino pain”

The Problem(s)

Free text is: difficult to access



The Problem(s)

Many free text tools are hard to use

Ease of adoption of clinical natural language processing software:
An evaluation of five systems



Kai Zheng^{a,b,*}, V.G. Vinod Vydiswaran^k, Yang Liu^b, Yue Wang^c, Amber Stubbs^d, Özlem Uzuner^e,
Anupama E. Gururaj^f, Samuel Bayer^g, John Aberdeen^g, Anna Rumshisky^h, Serguei Pakhomovⁱ,
Hongfang Liu^j, Hua Xu^{f,*}

"The average ratings provided by the end user evaluators on ease of use and ease of interpreting output... indicat[e] that this group of users generally deemed the systems extremely difficult to work with"

<https://pubmed.ncbi.nlm.nih.gov/26210361/>



<http://project-emerse.org/presentations.html>

A solution



- A system “for the people”
- Users search the EHR on their own
 - No need to wait in a queue for an analyst or a data scientist
- Data are kept secure within a centralized, audited system
 - No need to download/store the data elsewhere
- Easy-to-use for non-technical researchers

What is EMERSE?

A search engine, kind of like Google, for free text medical record documents
(technically, it's an *information retrieval* system)



Simple to use

What is EMERSE?

Software we've been developing and refining for 17 years



2005



2021

em**rse**
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

What is EMERSE?

A research tool, open-source licensing

- picking the right tool for your research is important; multiple tools are often needed



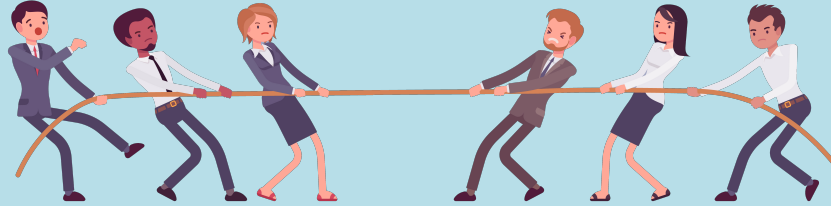
What isn't EMERSE?

It is not: natural language processing (NLP)

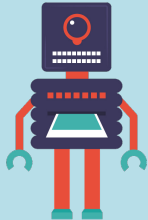
- but full NLP may not always be needed
- and NLP can be hard to use or customize
- (and we have plans to build in some NLP)



EMERSE vs NLP



EMERSE: human-in-the-loop *augmented* intelligence



NLP: *artificial* intelligence



EMERSE vs NLP



EMERSE

NLP

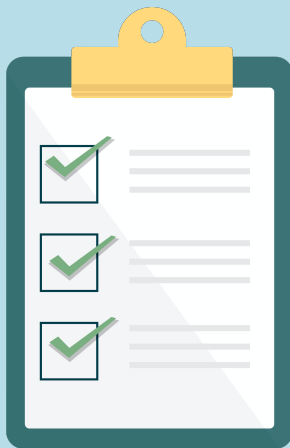
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Find cohorts

EMERSE allows you to find cohorts based on things mentioned in the notes

- diseases
- drugs
- symptoms
- anything*



*if it is mentioned

Find cohorts

It's perfect for finding rare things...

...like rare cancers



See this talk for more details:

<https://vimeo.com/677482835>

“Using EMERSE to Improve Research
Involving Rare Cancers”

Highlight documents for chart review

Thoracocentesis confirmed the recurrence of mantle cell lymphoma. Disease restaging work-up revealed multicompartiment lymphadenopathy in the neck, mediastinal, retrocrural, retroperitoneal and pelvic regions. Bone marrow was also involved. The patient was treated with a total of six cycles of rituximab, cyclophosphamide, vincristine, doxorubicin and dexamethasone (R-HyperCVAD) completed in January 2007. That treatment led to complete remission that lasted until October 2008, when the disease was found to have recurred in the left pleural space and retroperitoneum without bone marrow involvement.

EMERSE Bundles

Saved sets of search terms

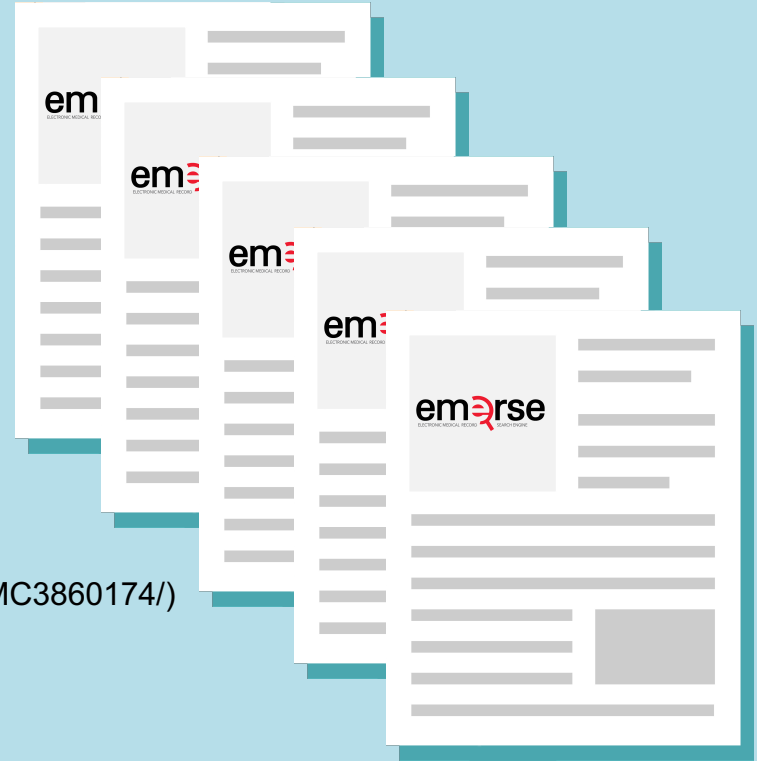
Shared among users

Helps standardize searches

Supports reproducibility

- Some teams publish Bundles in their publication's appendix

(example: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3860174/>)



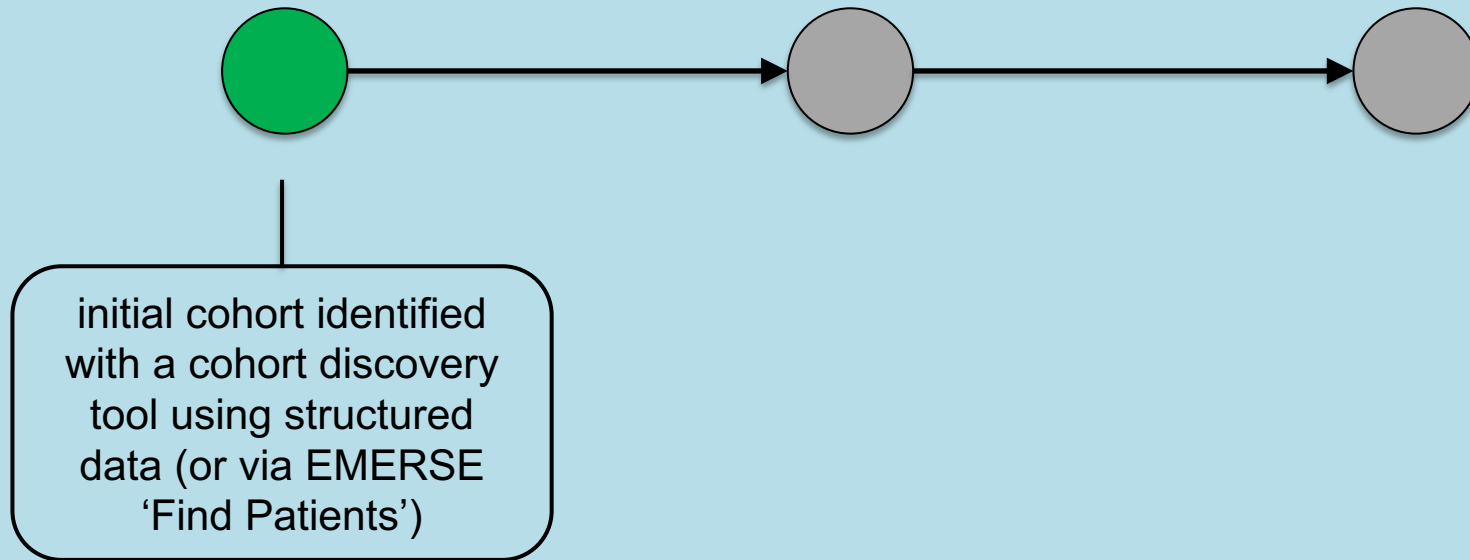


EMERSE is \equiv *fast*

Query to identify all patients with the following	Reporting DB time (s)	EMERSE time (s)	EMERSE advantage
cavernous hemangioma	14,652	2	7,320x
gray platelet syndrome	14,940	2	7,470x
inferior lingular segment of the left upper lobe	17,784	9	1,980x

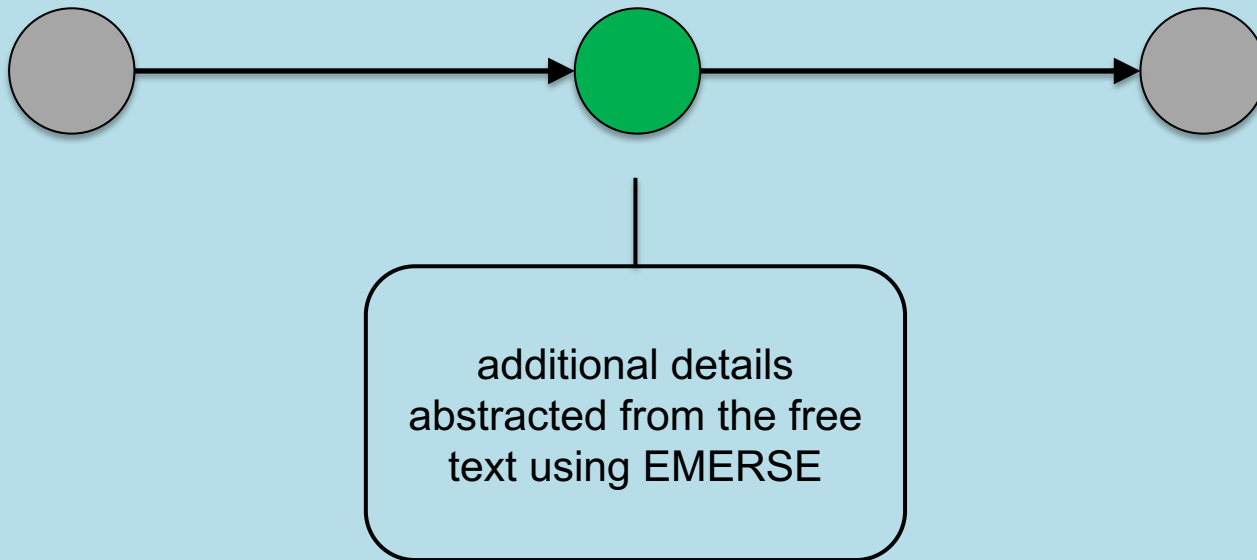
...enabling real-time querying

Typical workflow

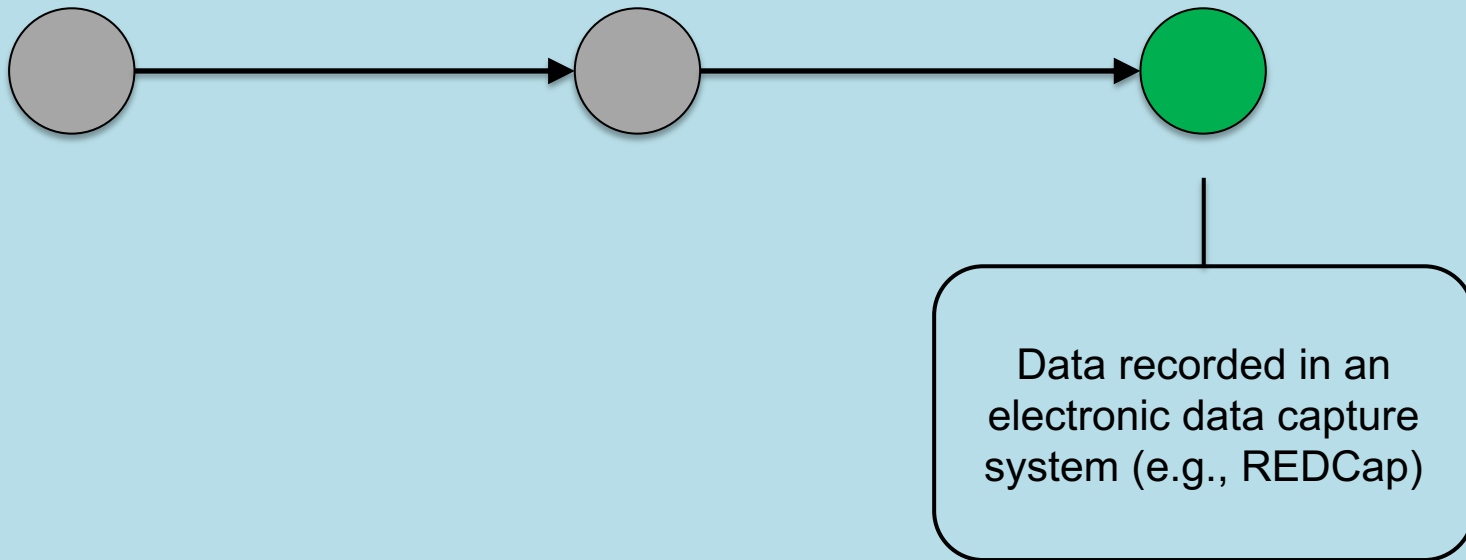


Cohort discovery tools:
DataDirect @ Michigan
i2b2, LEAF, others elsewhere

Typical workflow



Typical workflow



Publications using EMERSE

463 papers

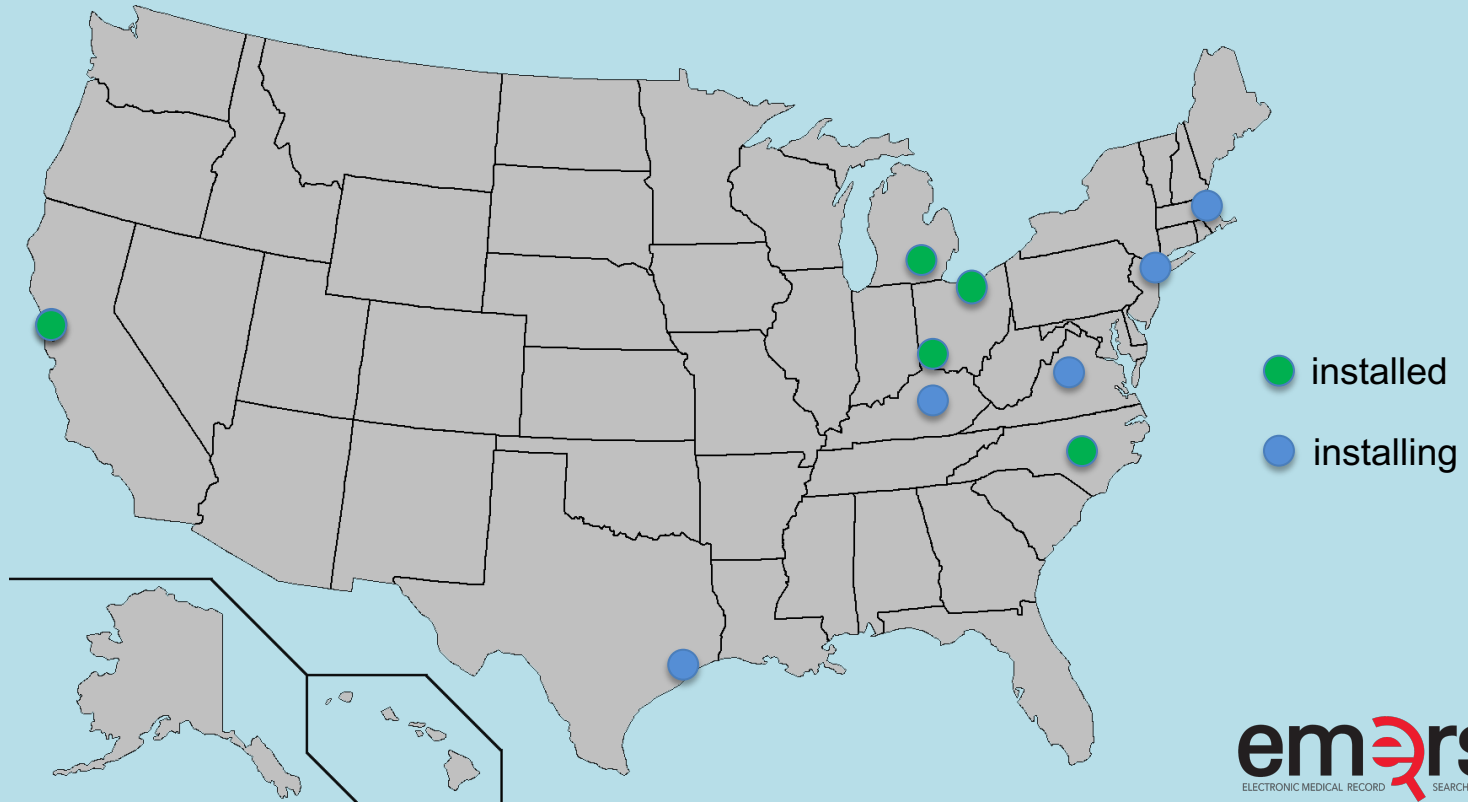
84 abstracts



Full list at:

<http://project-emerse.org/publications.html>

Where is EMERSE?



The future...

EMERSE Research Informatics Network

real-time, secure
cross-site queries



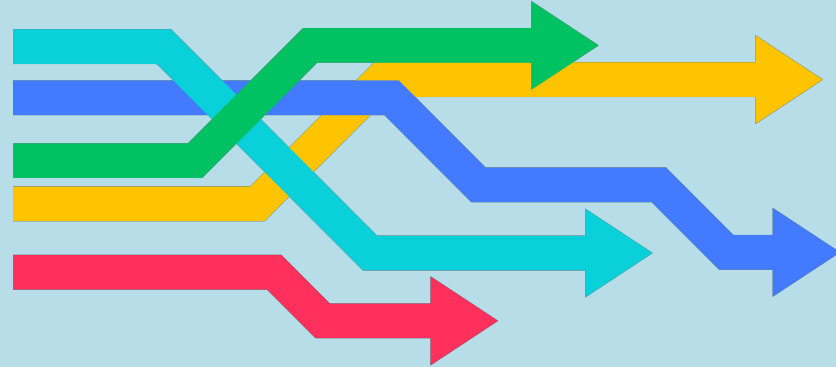
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The future...

Incorporation of NLP features

- negation
- uncertainty
- patient vs other
- named entity recognition/mapping to ontologies



Data extraction from templated notes

Upcoming presentations about EMERSE



March 3, 2022, 2:00 – 3:00 PM ET

EMERSE Meeting Series: - Machine-Redacted Clinical Text, EMERSE, and Solr API: a data scientist-friendly environment for utilizing clinical notes for research (Presentation by UCSF)

Register here: <https://bit.ly/emerse-march-2022>



March 24, 2022, 10:30 – 12:00 PM CDT

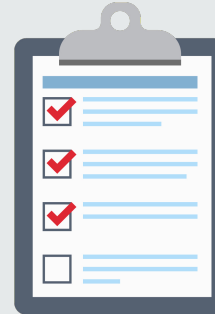
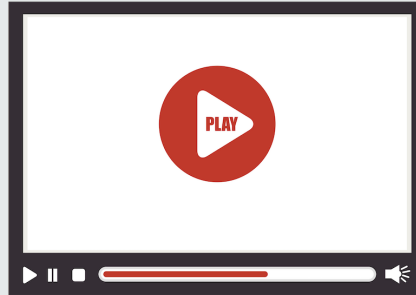
AMIA Informatics Summit (Chicago); <https://bit.ly/emerse-amia-2022>

Session 36: Systems Demonstrations - Improving Workflow: Informatics Tools No Researcher Should Be Without

"The Open-Source EMERSE (Electronic Medical Record Search Engine) Tool"
(presentation by Case Western Reserve U)



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Twitter: @projectEMERSE

publications
software releases
announcements
webinars

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Guan Wang

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