# Disclosure of AI Systems in Nested Knowledge

There are several tools in Nested Knowledge that utilize artificial intelligence and machine learning to make systematic reviews easier and more effective to conduct. This page provides technical details on what these features are, and how your data is used.

# 1. RoboPICO

- Used to highlight Populations, Interventions/Comparators, and Outcomes in abstracts during Screening
  - *Optional:* by default this feature is toggled on, but can be toggled off and will remain off for all abstracts in the queue/ongoing modules and Study Inspector until toggled back on.

Nest Home Activity	Abstract Full Text Supplements Related Reports CT.gov					
Settings	Dupilumab in Chronic Spontaneous Urticaria (DUPICSU)					
Literature Search Other Sources Duplicate Review Search Exploration	Brief Summary: The purpose of this study is to assess the efficacy in reducing disease activity and safety of Dupilumab in adult patients with chronic spontaneous urticaria (CSU) who are symptomatic despite H1-antihistamine treatment. Detailed Description: Treatment with Dupilumab has been shown to reduce clinically significant exacerbations and to improve skin symptom control as well as quality of life in moderate to severe atopic dermatitis patients and moderate to severe asthma patients. It has been approval by European Medicines Agency (EMA) for the treatment of atopic dermatitis patients in September					
Screening	2017. Dupilumab is a novel monoclonal antibody that inhibits interleukin-4 (IL-4) and interleukin-13 (IL-13) signaling and was previously found to be effective in atopic dermatitis and asthma. Considering that CSU and atopic diseases share many common features (e.g. key pathogenic role of mast cells and					
Tagging 🔅						
MA Extraction						
Critical Appraisal	standard dosing of antihistamines. In antihistamine-refractory patients with chronic spontaneous urticaria, the currently only licensed treatment is omalizumab, a monoclonal anti-IgE antibody. In 2014, omalizumab has been licensed for add-on therapy in CSU patients who still have symptoms despite					
Study Inspector	standard-dosed antihistamine treatment. There is, however, still a great medical need for additional treatment options, as 20-40% of patients are still without effective therapy. These patients have no other licensed treatment option and can only be treated off-label with therapeutics with several known safety risks					
Synthesis Dashboard Editor Abstract Editor Export	such as Cyclosporine A. Dupilumab has excellent potential to provide symptom control in CSU. This study will provide additional valuable insights into the therapeutic potential of Dupilumab in improving quality of life in these patients, in addition to managing CSU symptoms. Study Type: Interventional Actual Enrollment: 72 participants Status (as of import): Completed					
	Population/Problem Intervention Outcome Your Keywords					
	(Keywords V) (Bibliographic fields V) (Edit)					

- Used to generate most commonly reported terms among the literature, to inform the build of search queries in Search Exploration
  - Optional: Search Exploration is not a required step in AutoLit and simply offers assistance to build a search. However, when it is used, RoboPICO auto-generates terms when concepts are entered and "Refresh Exploration" is selected. This cannot be switched off when Search Exploration is used.

Last update: 2023/11/16 15:19 wiki:support:ai\_disclosure https://wiki.nested-knowledge.com/doku.php?id=wiki:support:ai\_disclosure

Nest Home Activity		Create ⑦			Concepts	Preview Final
Settings		Metformin	<b></b>	ACT X alzheimers X dia	abetes X)	2 alzhelmers
Literature Search Other Sources Duplicate Review Search Exploration		Group: Group	•		$\sim$	3 AND 4 diabetes 5 NOT 6 ( 9477 results 7 ACT
Screening	٠	Refresh Exploration		Abstracts RoboPICC	Topics Keywords	
Tagging	٠	Population		Intervention	Outcome	Definition
MA Extraction	0	Participants		Metformin	Oxidative Stress	MeSH Definition 🗷
MAEXUACUON	*	Patients		Liraglutide	Expression	Metformin
Critical Appraisal		Years		N-acetyl Cysteine	Levels	
Critical Appraisal		Ad		Donepezil	Diabetes	A biguanide hypoglycemic agent used in the treatmen non-insulin-dependent diabetes mellitus not respondi
Study Inspector		Dementia Alzheimer's Disease		Stz Ade	Hypertension Ad	to dietary modification. Metformin improves glycemic
Study Inspector		Age		Age Angiotensin Receptor Blockers	Ad Mortality	control by improving insulin sensitivity and decreasing
Synthesis		Individuals		Diazepam	Neuroinflammation	intestinal absorption of glucose. (From Martindale, Th Extra Pharmacopoeia, 30th ed, p289)
Dashboard Editor		Diabetes		Dmf	Retinal	Extra mamacopocia, sour cu, p200)
Abstract Editor		Type 2 Diabetes		Gnps	Risk	Entry Terms
Export		Aged		Hfd	Age	Dimethylbiguanidine
		Older Adults		High-fat Diet	Benefit	Dimethylguanylguandine
		People		Intensive Lifestyle Intervention	Cardiovascular Disease	Glucophage
		Data		Intervention	Cognitive Function	Metformin Hydrochloride
		Women		Microbes	Cvd	Hydrochloride, Metformin
		Older		Msx	Daytime Sleepiness	Metformin HCI
		Subjects		Plain-gnps	Death	HCI, Metformin
		T2dm		Rosiglitazone	Depressive Symptoms	
		Cognitive Impairment		Tmao	Disability	
		Hypertension		Trimethylamine N-oxide	Football	
		Men		Weeks	Heart Disease	
		Sd		Aceis	Incidence	
		Type 2 Diabetes Mellitus		Agonists	Lung Cancer	
		Alzheimer's Dementia Baseline		Ai-derived Body Composition	Lung Cancer Death Memory Retrieval	
		0 10 20	30	Alm 0 2 4 6		8
		Frequency	30	Frequency	Frequency	·

#### a. Which data does RoboPICO use?

The abstract of records is made available to the model.

#### b. How does the model work?

RoboPICO uses a fork of the machine learning system offered by RobotReviewer. Specifically, Namedentity Recognition models extract Patient/Problem, Intervention, and Outcome entities from data in article abstracts. NK's modifications to RobotReviewer are open and General Public Licensed.

This model is not trained or updated from your data.

# 2. Bibliomine

Bibliomine extracts references from full text PDFs. Typically, previous systematic reviews or landmark studies are bibliomined, importing all cited references as records directly into your nest. This feature does not access your data unless you use it.

*Optional:* This feature is helpful if, for example, you are performing an update on an existing review, but is not required to successfully upload records to a nest.

### a. Which data does Bibliomine use?

Bibliomine consumes any PDFs uploaded for its purposes. It writes records with full bibliographic data to your nest (pending user addition).

### b. How does the model work?

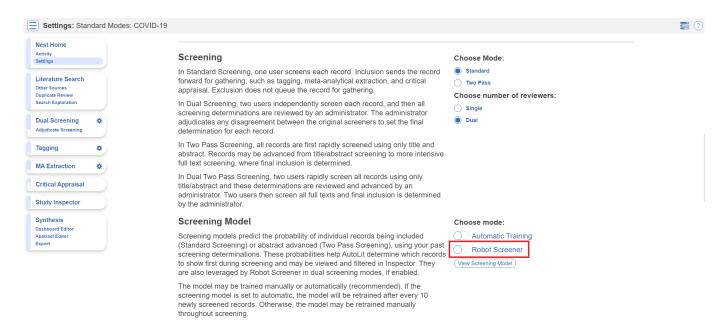
Bibliomine uses Cermine, an open source machine learning library for mining documents. Using DOI & title extracted, full bibliographic data will be retrieved from PubMed or CrossRef (in that order of preference).

This model is not trained or updated from your data.

# 3. Robot Screener

Robot Screener uses a model trained on human screening decisions to make reviewer-level screening decisions based on inclusion probabilities. In effect, it replaces one human reviewer when turned on in nests with a Dual Screening mode. This feature does not have access to your data unless you turn it on in Settings.

*Optional:* This feature is helpful to speed up the Screening process, but is not required to successfully Dual Screen all records in a nest.



# a. Which data does Robot Screener use?

The following data from your records are model inputs:

- Bibliographic data
  - $\circ\,$  Time since publication of the record
  - Page count
  - Keywords/Descriptors
- Abstract Content
  - N-grams
  - OpenAI text embedding (ada-002)
- Citation Counts from Scite, accessed using the DOI
  - Number of citing publications

- Number of supporting citation statements
- Number of contrasting citation statements

The model is trained on adjudicated AB or FT screening decisions, depending on your screening mode. This includes the exclusion reason. Similarly, the model outputs a screening decision for each record requiring a reviewer-level decision.

If enabled, Robot Screener will continuously screen new records as they imported into your nest.

#### b. How does this model work?

Learn more about the screening model that generates inclusion/advancement probabilities for Robot Screener. A probability threshold, optimized on a geometric mean of precision and recall in a cross validation, determines if records should be included or excluded.

This model is only available within your nest & its parameters are not shared with other nests or users.

# 4. Smart Tag Recommendations

Smart Tag Recommendations are context-aware recommendations of relevant concepts within full text PDFs. These recommendations include provenance via an annotation within the PDF, making review of the model's work possible.

*Optional:* This feature is helpful to speed up the data extraction process, but is not required to perform data extraction of all records in the nest. Standard Tag Recommendations should remain selected to keep this feature off.

Nest Home				
Nest Home Activity		Towning		
Settings		Tagging	Choose mode:	
		In Standard tagging, the entire tagging hierarchy is made available as an open-	Standard	
iterature Search		ended list.	◯ Form-based	
Other Sources Duplicate Review Search Exploration		In Form-based tagging, tags can be turned into questions to be posed to the reviewer. There are three types of questions: Single Apply questions apply the tag selected, Single Select questions allow for only one of the child tags to be applied		
Jual Screening	٠	and Multiple Select questions allow for multiple child tags to be applied. All tags may have text text content. Switching between these modes results in no loss of data.		
Tagging	•	чин.		
	<b></b>	Tag Recommendations	Choose type:	
MA Extraction	٠	Smart tag recommendations use GPT 4, a large language model from OpenAI, to	Standard	
Critical Appraisal		provide automatic highlighting of full texts based on your configured tags. Standard recommendations use keyword lookup.	Smart 📼	
Study Inspector		Import	Upload data:	
Synthesis Dashboard Editor Abstract Editor		for texisting tagging data for any record already in your nest by uploading a spreadsheet.	Begin	

### a. Which data does Smart Tagging use?

Recommendations are generated for the full-text PDFs of all included records. You instruct the model through:

• Standard Tagging:

- Tag Names
- Hierarchical structure of tags
- Form Based Tagging:
  - Tag Names
  - Question Types
  - Question

### b. How does the model work?

Smart Tagging uses OpenAI's GPT-4, a large language model, to identify relevant concepts or answer questions about plain-text reductions of full-text PDFs. The model's recommendations back to the PDF as an annotation using fuzzy (edit distance) search.

# 5. Synthesis AI Disclosure

The records included in Synthesis, as well as the Tags applied to underlying reports, may have been collected by users with assistance of Artificial Intelligence. The Artificial Intelligence tools are generally integrated with direct researcher oversight, and the nest owners have final responsibility for the accuracy of all Screening and Tagging.

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Last update: 2023/11/16 15:19