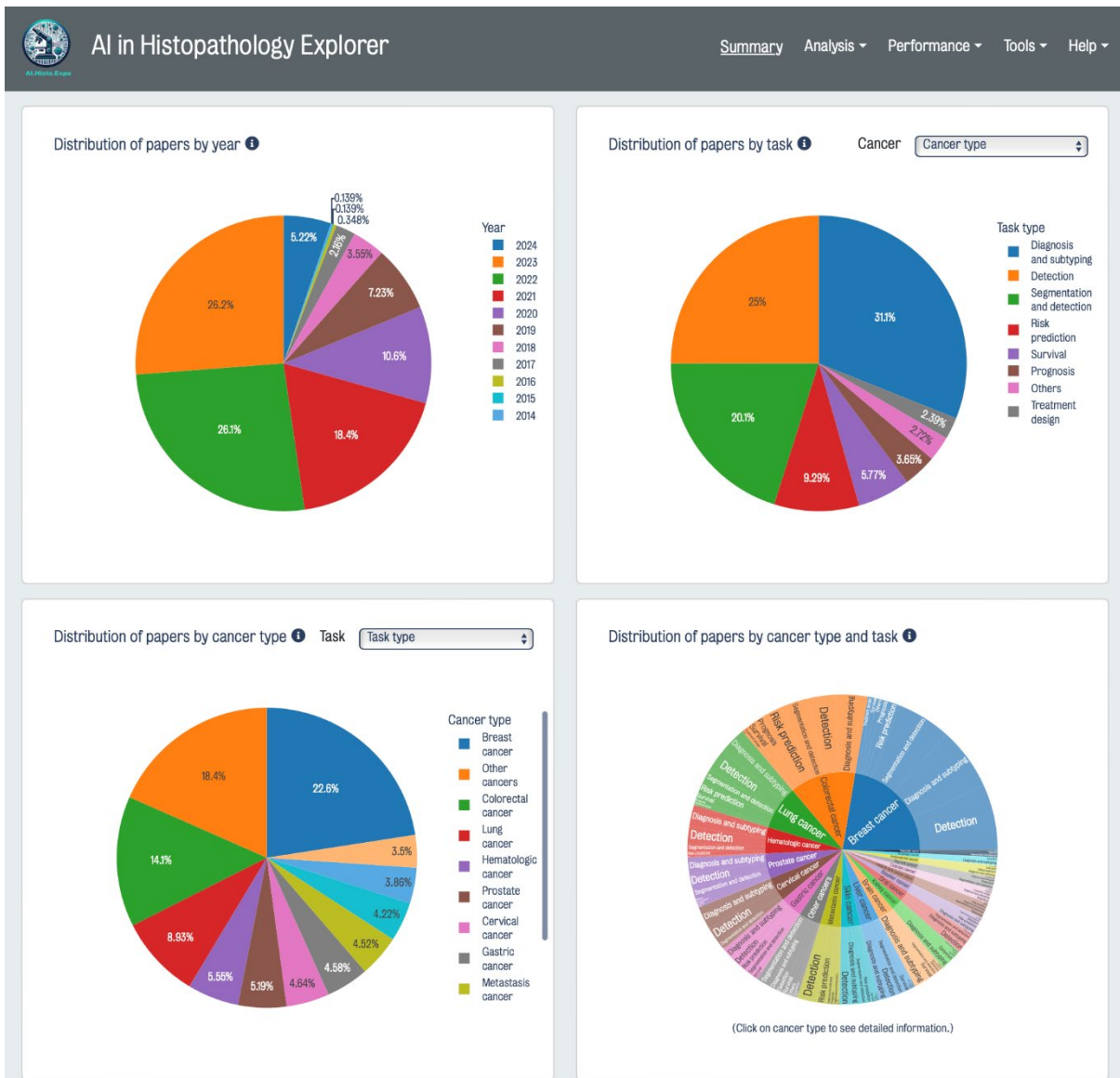


Summary page:

What has been focused on? What is still missing?

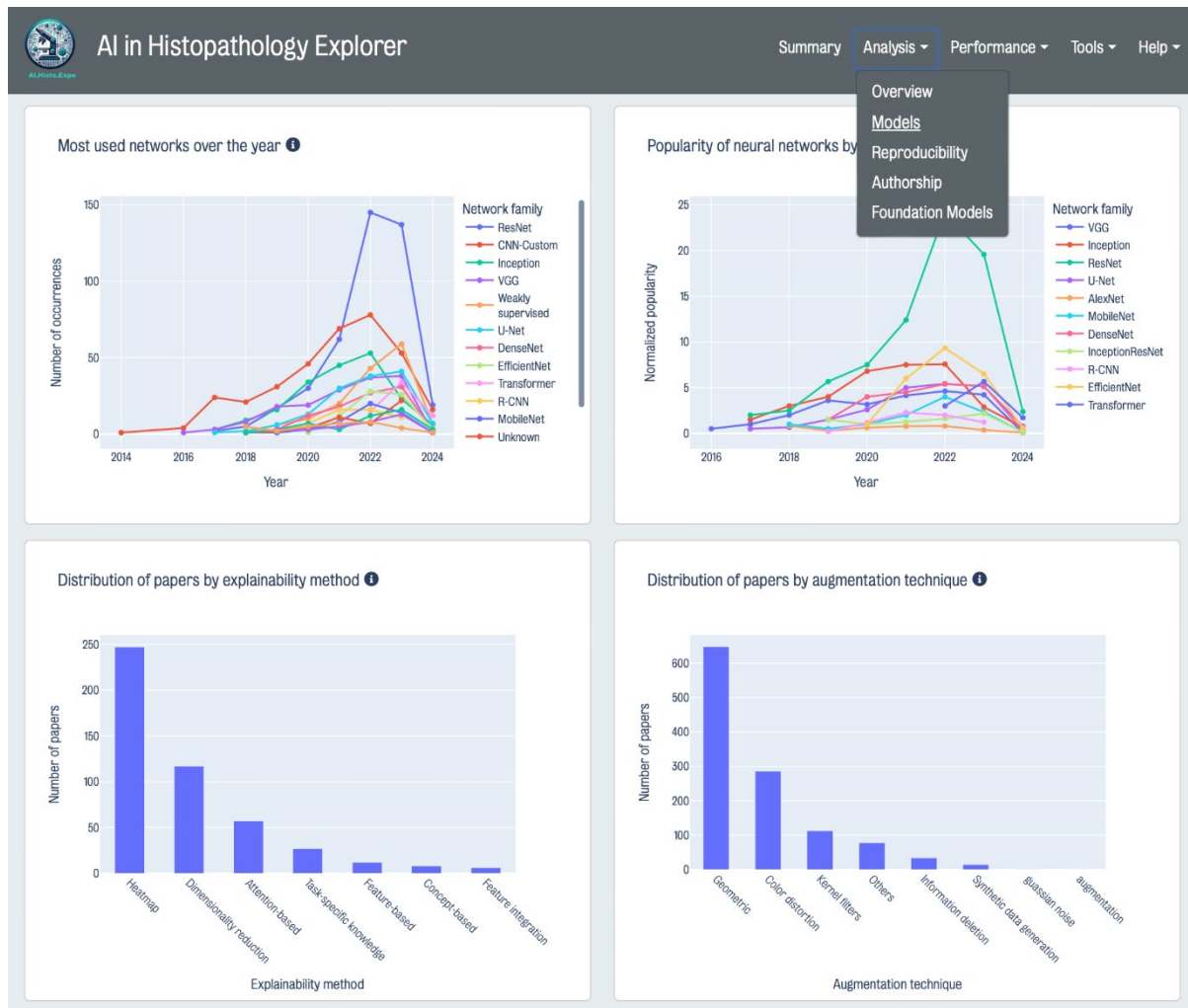
The summary page gives a general overview of the number of AI studies applied to different cancer types, different clinical tasks such as diagnosis and prognosis, AI network types, patient demographics, data origin, paper quality and more. These data could provide insights into research focuses and gaps. For instance, almost 400 AI studies were aimed at breast cancer, while only 59 studies were aimed at brain cancer. Moreover, AI tools have mostly focused on diagnosis tasks such as classifying cancer subtype and grade (30.5%). However, the application of AI to treatment design is underexplored (2.38% of studies). You can create customized plots using the filters to generate tailored summaries of specific cancer types or tasks. Most importantly, you can also click on any figure segment to obtain the list of associated papers.



Analysis menu:

Exploring trends in AI and histopathology

The [pages](#) under the Analysis menu enable you to explore how interest in AI has evolved over time and across different cancers and histopathological data types. Researchers could also identify important aspects of AI model pipeline design, such as datasets, preprocessing techniques, explainability methods and network model popularities.



Analysis menu:

Foundation models page

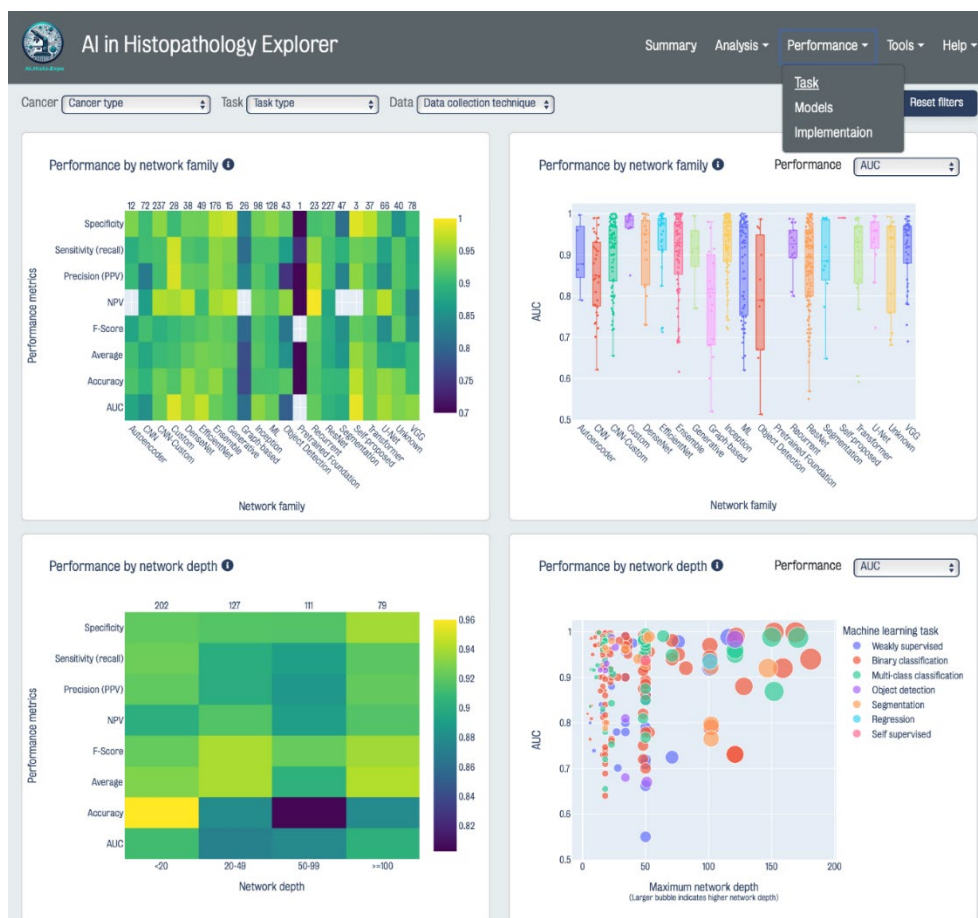
Foundation models, which are large deep learning models trained on a huge amount of images to perform general tasks, have shown great potential in a lot of areas, including histopathology. As these models are evaluated on various classification tasks, we have created a [separate page for foundation models](#). On this page, you can compare the performances of different foundation models as well as their evaluations on various clinical tasks, data and capabilities.



What works best?

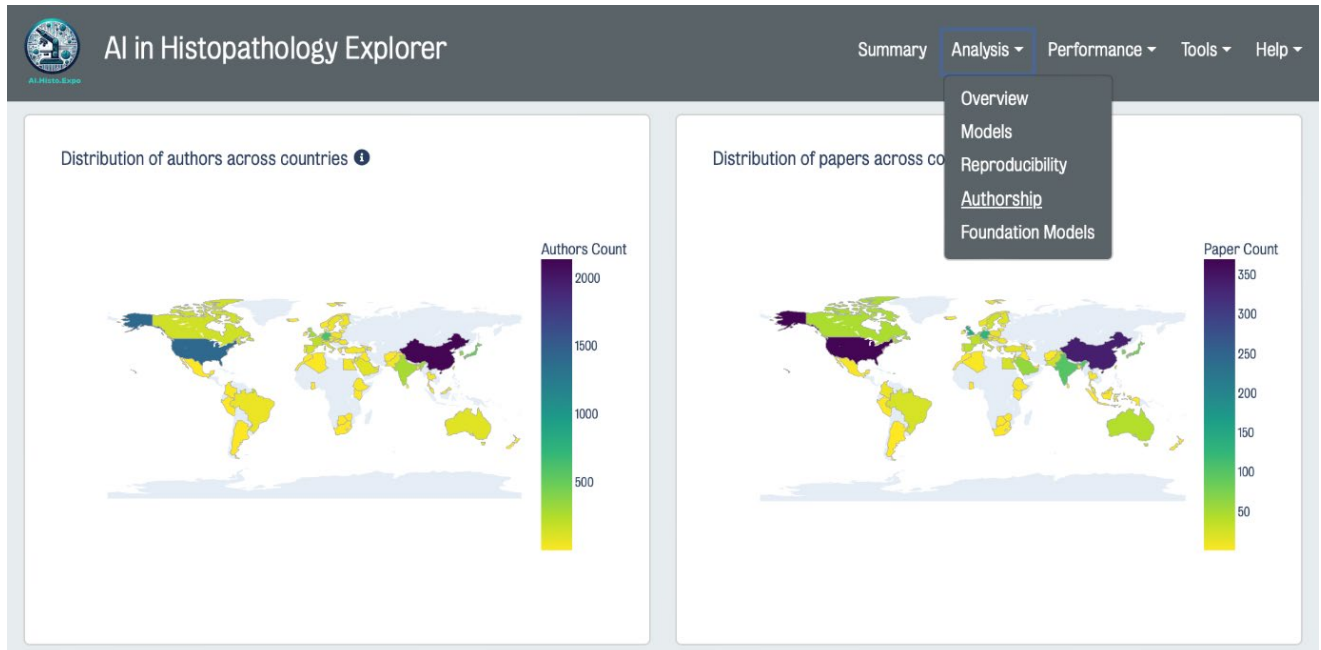
Exploring AI performance across clinical tasks and methods

Once you've seen where the research is happening, you might want to ask: How well do these AI tools actually work? That's where our [Performance section](#) comes in. There are various measures of performance, including specificity (how well a model recognizes cases when a condition is not present) and sensitivity (how well a model recognizes cases when a condition is present). Different clinical tasks may require different balances of sensitivity and specificity – for example, cancer screening might prioritize high sensitivity to catch as many true cases as possible, while confirmatory diagnostics might need high specificity to avoid false alarms. Area Under the Curve (AUC) is another common measure that balances sensitivity and specificity, with 1.0 being perfect and 0.5 meaning no better than random. With just a few clicks, you can explore how different studies perform and compare what's working best across cancer types. For example, studies aimed at breast cancer achieved an average performance of 90%. Transformer-based models perform well in colorectal cancer (median AUC 0.91) but achieve lower performance in breast cancer (median AUC 0.824). You can create your own figures using filters to select the most appropriate metric for your task, cancer types, and data collection techniques, including specificity and sensitivity. All figures in the dashboard can be downloaded for use in publications.



Learn about AI in histopathology around the world

AI in histopathology is a global effort. Through our Authorship page, you can see how different countries contribute to this growing field. You can also identify publicly available data from different countries by clicking on any figure segment. This could help facilitate data access and collaborations.



Tools menu: empowering your research

The [Intelligent Explorer page](#) is designed to facilitate the identification of pertinent research studies. Here you can query all studies that were applied to predicting HER2 from histopathology images or studies aimed at images of samples using immunohistochemistry. There are also integrated links that provide immediate access to associated datasets and code. In addition, the visual insights panel will provide summary graphics based on your filters. You can also download the list of papers for your analysis.

The screenshot displays the 'AI in Histopathology Explorer' interface. At the top, there is a navigation bar with 'Summary', 'Analysis', 'Performance', 'Tools', and 'Help'. A dropdown menu is open under 'Tools', listing 'Paper search', 'Intelligent explorer', 'Design assistant', and 'Network tool'. The main content area is titled 'Intelligent research explorer' and includes an 'Article search' section with a 'Visual Insights' button. The search filters are as follows:

- Cancer type: Breast cancer
- Class: Malignant (58)
- Task type: Not specified
- Machine learning task: Not specified
- Data collection technique: Not specified
- Multiple cohorts: Not specified
- Network type: Not specified
- Dataset: Not specified

Search options: Exact Match, Nearest Neighbours-based. Buttons for 'Submit' and 'Clear' are present.

Visual insights include three charts:

- Distribution of papers by year:** A bar chart showing the number of papers from 2017 to 2023. The y-axis is 'Number of papers' (0-18), and the x-axis is 'Year'. The number of papers increases significantly in 2022 and 2023.
- Distribution of papers by performance average:** A bar chart showing the number of papers across performance average ranges. The y-axis is 'Number of papers' (0-25), and the x-axis is 'Average' (0.80-0.85, 0.85-0.90, 0.90-0.95, 0.95-1.0). The number of papers increases as the performance average improves.
- Reported quality index parameters among papers:** A heatmap where the y-axis is 'Paper ID' and the x-axis is 'Quality index parameters' (A, B, C, D, E, I, M). A color scale on the right ranges from 0 (black) to 1 (red).

Below the charts, there is a section for 'Ranked papers based on similarity and performance'. A 'Sort by' dropdown is set to 'Average performance', and a 'Download' button is available.

ID	Title	Publication year	Resources	Dataset	Model type	Average performance	Cancer type	Data collection technique	Dataset size
682	A High-Precision Classification Method of Mammary Cancer Based on Improved DenseNet Driven by an Attention Mechanism.	2022	Data Code	BreakHis	Self-proposed	0.999	Breast cancer	H&E	7909 (Whole slide images)

In summary, HistoPathExplorer offers a comprehensive analysis framework to support the development of AI models for digital pathology. Whether you are exploring public datasets, assessing model architectures and performances, performing literature reviews, optimizing your model design or involved in regulation or policy making, our dashboard provides the figures and tools needed to support innovations in this field. Contact us or submit relevant papers through [here!](#)