

BOOSTING DIGITAL PATHOLOGY AND IMPROVING PATIENT CARE

Leveraging Artificial Intelligence to streamline the toxicology assessment process.



THE BUSINESS CHALLENGE

Drug safety assessment is an essential part of treatment evaluation prior to clinical application. During this process, expert pathologists review thousands of slide images (approximately 1,600 slides per study) to identify the presence of lesions, caused by the drug under evaluation, in tissues of different animal organs. These tissues are very complex, and the lesions can be extremely subtle and difficult to identify visually. About **70% of tissue slides do not contain lesions** but still need to be carefully analysed before classing them. Thus, **pathologists spend the majority of their time looking at healthy slides**. **Automating parts of the screening therefore holds significant time gains** and could allow the experts to focus on more complex cases or strategic decision-making.



THE SOLUTION AND IMPACT

Leveraging recent advances in Computer Vision, and the wealth of data collected throughout digital pathology, our data engineers developed a solution which could speed up the lesion detection process by:

- **Detecting lesions and assigning probabilities** to slides
- **Discarding healthy slides** (slides containing no lesions) for faster screening
- **Providing interpretable predictions** in the form of **heat-maps** to prioritize lesion prone areas

The **solution guides pathologists in prioritizing the areas to focus on** for remaining slides, and largely **reduces time needed to find lesions and assess drug safety**. A key design choice for this solution was to keep it **scalable and reproducible** for potential extensions on larger data sets or other organs. The solution code-base is therefore highly modular and easily adaptable, such that the chosen model is tissue or organ agnostic, and can be developed for Whole Slide Image-level classification and tile-level classification. Our solution **won a competitive PoC process** against several teams, enabling us to become the long-term strategic vendor for Roche.

In the short-term, the solution has the potential to **significantly increase speed and accuracy of the toxicology assessment process**. However, in the long-term automated lesion detection is a **cornerstone towards fully automated toxicology studies**, eventually combining the findings of different organs, species as well as other lab measures such as blood tests.

* **Watch the joint keynote** with Roche on the project at the Applied Machine Learning Days, 17th March 2021.