

Standing on the Shoulders of Giants – Towards a winning FP9 proposal

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INTRODUCTION

Rapid technological advancements have opened up opportunities to synergise the state of the art in optical physics, artificial intelligence and human expertise. This can then create more complete and more accurate analysis of tissue samples and associated patient risk assessments.



Continuing improvements in the speed, spatial precision and spectral precision of optical detectors allows for more complete tissue scans.

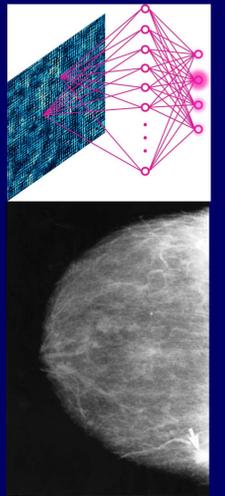
Rapid growth of computing capacity provides for the full potential of neural networks to be realised.

Improvement in training and education of pathologists will increase supply of ground truth data about patients.

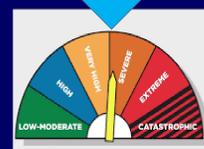
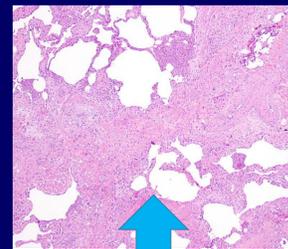
ARTIFICIAL INTELLIGENCE

A golden age in computing power and capacity is underway and the true potential of Neural Networks is finally being realised.

Technologies like Driverless Cars and more particularly platforms like the DeepMind Breast Mammogram model illustrate its power in image processing in medical scenarios.



HUMAN EXPERTISE



Artificial intelligence can only be realised from human intelligence via ground truth labelling. This human expertise will then “live forever” in the models and will grow as the models can continue indefinitely to absorb more and more ground truth labels leading to ever better learning systems.

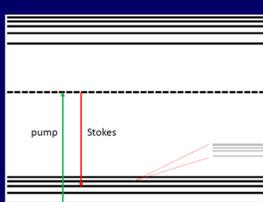
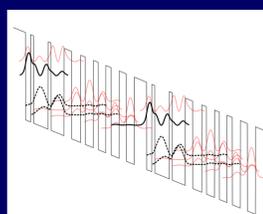
Juries of hospital consultants are needed to supply their expertise to many thousands of cases to build a truly intelligent model.

OPTICAL PHYSICS

For many years there has been a drive to go beyond traditional colour image data when attempting to use image processing to examine tissue sections. A variety of InfraRed and Raman imaging methods have been used to gain chemical rather than just morphological and pattern data. The primary weakness being how slow the data acquisition is.

In recent years great strides have been made at speeding up the data acquisition without major loss of the quality of the data.

Quantum Cascade Lasers, Stimulated Raman Spectroscopy and Intelligent Spectral Sub-sampling offer the most promise for rapid chemical imaging.



CONCLUSION

The ingredients are now available to create precise, accurate, objective, economic, ergonomic, rapid and robust solutions towards automatic processing of human tissue sections and associated predictions of patient risk levels.

Thus a very strong Framework Program 9 or “Horizon Europe” as it is also known proposal can be formulated to stand on the shoulders of these giants.