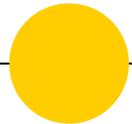


An Approach to Explainable AI for Digital Pathology



UNIVERSIDAD
DE SEVILLA
1505

J. M. Montes-Sánchez , L. Muñoz-Saavedra , F. Luna-Perejón , J. Civit-Masot , S. Vicente-Diaz , A. Civit
Robotics and Computer Technology Lab. Reina Mercedes s/n, E.T.S. Ing. Informática, Universidad de Sevilla
Sevilla, Spain. Email: {jmontes, luimunsaa, fralunper, jcivit, satur, civit}@atc.us.es



The Blackbox

- ◉ Many medical diagnostics are currently based on imaging technologies.
- ◉ The development of machine learning (ML) image processing has increased the research on diagnostic support aids based on these technologies.
- ◉ Medical image processing will experiment a breakthrough
- ◉ when this type of tools become widely available and accepted by the medical community.
- ◉ A problem is related to the lack of understandability of their diagnostic suggestions due to their Blackbox nature



Approaches to Understandability

- Understanding the internal layer results and their contribution to the system global outputs.
- Modifying the system architecture to make the internal layer results more meaningful.
- Using a “model agnostic” component that provides complementary explanations .



Digital Pathology (DP)

DP is a specially difficult case due to:

- Digital pathology is not just a transformation of the classical microscopic analysis of histological slides to digital visualization, it is an innovation that is changing medical workflows greatly;
- Much information is hidden in high dimensional spaces, not easily accessible at first sight, thus we need AI systems to help the pathologists in accessing and interpreting his data.
- The new workflows should provide ways in which pathologists can easily use their existing knowledge



TECHNOLOGY BENCHMARKING

- Good results achieved for cancer detection with an accuracy similar to that achieved by an average pathologist (e.g. breast cancer Chamelyon 16 ROC AUC 92% error rate 0.52%)
- It is necessary to make the results transparent and explainable on demand (e.g. areas in blue are considered a type X tumor because characteristics A and B are present)



Conclusions

Designing, implementing, testing and evaluating by professionals and students a small scale understandable digital pathology diagnostic aid could represent a major scientific and technological break-through in the field of software and integration for medical imaging.