TIA Centre
TISSUE IMAGE ANALYTICS

Newsletter - Winter 2025

Welcome to the latest Newsletter of the **TIA Centre** at the University of Warwick. This newsletter provides updates on the Centre's recent activities and offers insights into our work over the past few months. Additionally, it includes details of upcoming events and initiatives for the months ahead.

Since our last newsletter in Summer 2025, members of the **TIA Centre** have been actively engaged in numerous research initiatives, contributing to the development of several notable publications. We would like to take this opportunity to highlight a selection of the research papers that have been published as journal articles:

Novel growth pattern-specific digital marker of TILs improves stratification of lung adenocarcinoma patients A AlRubaian et al, The Journal of Pathology
Lung adenocarcinoma (LUAD) is one of the most prevalent forms of cancer and continues to be associated with high mortality rates, despite recent advances in cancer therapy. Effective risk stratification is critical for guiding treatment decisions and improving our understanding of disease mechanisms. However, current prognostic approaches face considerable limitations. Growth pattern-based grading serves as a prognostic indicator of tumour aggressiveness but is inherently subjective and prone to a high degree of variability among observers. Other well-established prognostic indicators, such as tumour infiltrating lymphocytes (TILs) and stromal TILs (sTILs) scores, provide valuable prognostic information but require labour-intensive assessment. The research proposed an AI-based growth-pattern-specific TILs (GPS-TILs) marker that quantifies TILs and sTILs within each growth pattern separately. Researchers demonstrated that the proposed GPS-TILs marker improves patient stratification with results highlighting the potential of GPS-TILs as a more objective and effective tool for improving patient risk stratification in LUAD.

From traditional to deep learning approaches in whole slide image registration: A methodological review B Elhaminia et al, Journal of Pathology Informatics
Whole slide image (WSI) registration is an essential task for analyzing the tumor microenvironment (TME) in histopathology. The analysis task is complex and considerably more challenging compared to radiology image registration, such as

magnetic resonance imaging or computed tomography, due to various factors. Currently, there is a noticeable gap in the literature regarding a review of the current approaches and their limitations, as well as the challenges and opportunities they present. This research aimed to provide a comprehensive understanding of the available approaches and their application for various purposes. Furthermore, current deep learning methods used for WSI registration were investigated, emphasizing their diverse methodologies. Available datasets were utilised and tools and software employed in the field explored. Future trends in this area of research were researched to identify open challenges.

Exploring the feasibility of AI-based analysis of histopathological variability in salivary gland tumours I Alsanie and A Shephard et al, Scientific Reports
This study uses artificial intelligence (AI) for differentiation between salivary gland tumours (SGT) using digitised Haematoxylin and Eosin stained whole-slide images (WSI). Machine learning (ML) classifiers were developed and tested using 320 scanned WSI. These included a benign versus malignant classifier (BvM) for automated identification of benign and malignant tumours, a malignant sub-typing (MST) classifier for subtyping four most common malignant SGT and a third classifier for malignant tumour grading. ML results were also compared with deep learning models. The research findings show that AI can be used for automated differentiation between SGT. Analysis of larger multicentre cohorts is required to establish the significance and clinical usefulness of these findings.

HistoKernel: Whole slide image level Maximum Mean Discrepancy kernels for pan-cancer predictive modelling P Keller et al, Medical Image Analysis
In computational pathology, labels are typically available only at the whole slide image (WSI) or patient level, necessitating weakly supervised learning methods that aggregate patch-level features or predictions to produce WSI-level scores for clinically significant tasks such as cancer subtype classification or survival analysis. Existing approaches lack a theoretically grounded framework to capture the holistic distributional differences between the patch sets within WSIs, limiting their ability to accurately and comprehensively model the underlying pathology. To address this limitation, HistoKernel was introduced, a novel WSI-level Maximum Mean Discrepancy (MMD) kernel designed to quantify distributional similarity between WSIs using their local feature representation. The analysis over large pan-cancer datasets shows that HistoKernel achieves performance that typically matches or exceeds existing state-of-the-art methods across diverse tasks, including WSI retrieval (n = 9324), drug sensitivity regression (n = 551), point mutation classification (n = 3419), and survival analysis (n = 2291). By pioneering the use of kernel-based methods for a diverse range of WSI-level predictive tasks, HistoKernel opens new avenues for computational pathology research

especially in terms of rapid prototyping on large and complex computational pathology datasets.

Other News items

The International Conference on Computer Vision, ICCV October 2025 in Hawaii saw presentations by George Wright and Manahil Raza. Manahil et al's research proposed a novel multimodal transformer-based model that fuses pathology reports, whole-slide histology images and biological pathway data into unified "prototypes" and show that this tri-modal fusion outperforms current state-of-the-art survival prediction methods across six TCGA cancer cohorts. Listen to Manahil's video here where she presents the team's findings.

My PhD Year 2: Celebration and Reflection – read about a year in the life of one of our PhD Students – Jiaqi Lv.

TIA Summer Research Internships 2025 - this summer saw the **TIA Centre** host three exceptional undergraduate students for an eight-week research internship, co-funded by the Warwick Undergraduate Research Support Scheme (URSS) and the Applied Computing research theme. Find out more about their experience whilst at the **TIA Centre.**

Great Success for TIA at MICCAI 2025 – a number of **TIA Centre** colleagues attended the Medical Image Computing and Computer Assisted Intervention (MICCAI) Society Conference held in South Korea in September 2025 and participated in a series of Challenges – find out more here. Review the challenge websites for further information on the MIDOG 2025 Challenge and the CHIMERA Grand Challenge. Dr Noorul Wahab, Research Fellow at the **TIA Centre** also shared more about his experience of MICCAI 2025 – read more here.

The Medical Image Understanding and Analysis (MIUA) Conference was a busy one for the **TIA Centre** this year. We successfully hosted the Frontiers in Computational Pathology Session at the conference which was ably led by Dr Adam Shephard, Dr Mostafa Jahanifar and Neda Zamanitajeddin - find out more about what was covered in this session here. George Wright, one of our PhD students also shared his reflection from attending the Conference for the first time.

TIA Centre colleagues were out in force at the European Congress on Digital Pathology (ECDP) Conference this year. The Conference was held in Barcelona and brought together a mix of researchers, clinicians, and industry professionals pushing the boundaries of digital and computational pathology. Four members of the **TIA Centre** share their experiences and highlights from the conference – find out more

here. Presentations during the conference, by Dr Mostafa Jahanifar, Neda Zamanitajeddin, Jiaqi Lv and Dr Mark Eastwood were complemented by, a number of poster sessions – find out more here from those presenting their posters. This year's conference also saw Department of Computer Science undergraduate, Celia Benitez Camacho, present her research during a poster session – read more here.

TIA Centre: Our Year in Numbers

We're excited to share a snapshot of our achievements and activities over the past year at the **TIA Centre**. From conference organisation to PhD graduations, it's been a busy and rewarding period. Take a look at our Year in Numbers below from September 2024 - August 2025!

Our world leading Seminar Series continues to run throughout the academic year – please view the **Seminars page** on our website to see any upcoming seminars and links to recordings of previous seminars.

Over the summer we have had several **TIA Centre** PhD students pass their PhD Viva - congratulations go to Drs **Mostafa Jahanifar**, **Made Wibawa** and **Gozde Gunesli** on your achievement!

We are delighted that we have now been joined by **Lucy Fox** as TIA Coordinator and **Simon Tandi,** TIA System Administrator, will continue working with us on fixed term contracts. In addition to this, Dr **Adam Shephard** is now an Assistant Professor within the Department of Computer Science and has become a member of the TIA Core Team. We have also been lucky to have several visitors to the **TIA Centre**. Hafsa Akebli, a second-year PhD student at the University of Udine in Italy joined us for a two month research visit – find out more about her experience **here**. Dr Afzan Adam is a visiting researcher from Universiti Kebangsaan Malaysia (The National University of Malaysia), who is currently with us for 6 months – read more about Dr Adam's area of research interest **here**. Want to know who else is involved in the **TIA Centre** – please take a look at our **Team page** on the website.

For more information on the **TIA Centre** or if you have any queries please do not hesitate to contact us using the contact details found **here.**

More news stories can be found **here**.

The next **TIA Centre** Newsletter will be available spring/summer 2026. If you are an external colleague and would like to be removed from this mailing list, then please reply to this email asking to be unsubscribed.

Many thanks for your continued interest and support in the work of the **TIA Centre**.

Wishing a joyful Christmas and a Happy New Year to those who celebrate, and a restful, happy break to everyone. We look forward to working with you in the coming year!