UMRI Mini-Projects Scheme
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Measuring Periodical Texture through Computational Means

Context

The mini-project takes as its starting-point the applicant's conceptualisation of periodical publications as fractal forms and his contention that, following Mandelbrot, fractional dimension *D* might be employed as a comparative, quantitative measure of the relative complexity of those forms.[1] Mapping individual periodical publications as hierarchical structures with multiple levels yields visualisations from which calculations for *D* can be derived. That mapping process has been facilitated by a digital tool (P-MApp) that segments the page, attributing a unique identifier to each item in the periodical, as well as calculating its area and positional co-ordinates. But the inputs into the mapping application and its outputs remain largely manual and highly labour intensive. The proposed mini-project will explore specific means by which those processes might benefit from further computational assistance.

Outcomes

The mini-project will focus on one or more of the three following processes and their specific outcomes:

i) Computer assistance to identify the boundaries of individual items. At present the researcher has to manually pinpoint the corners of each individual item on the page, after which P-MApp automatically completes the polygon, calculating mid-point and area and allowing the researcher to add meta-data text-fields. This project strand will explore whether OCR software can be used to automatically detect the boundaries of items using textual and formatting cues (e.g. font size of headings, white space for margins).

ii) Image manipulation of marked-up pages. Segmented pages can be colour-coded for specific metadata properties (e.g. genre). Tiling those marked-up pages for individual journal numbers or runs of numbers creates striking visualisations of the texture of the periodical for that particular property. In turn, specific properties can be isolated and colours manipulated in order to generate further visualisations, for example binary maps of presence/ absence. Thus far this image manipulation has been done manually using standard image editing software. Automating this process would yield significant gains in time spent by the researcher.

iii) Computerised calculation of image texture using fractal methods. Fractal dimension has been established in the literature as a convincing solution to the problems posed by image texture. A number of software packages (e.g. Benoit, fractalyse) exist that can be used to calculate the texture of given images and these have applications in a wide range of scholarly fields. This remains beyond the expertise of the applicant. In this strand, the visualisations created in strand ii) would submitted to analysis using the most appropriate of those software packages and a set of protocols established to enable researchers to derive robust and comparable measures of fractal dimension from those visualisations.

Next steps

At the moment, the conceptual value of P-MApp far outweighs its practical usefulness. Such is the time required by the researcher to mark-up periodicals that it can only be used on small, bespoke sets of data. The three specific outcomes above would significantly enhance its usefulness as a research tool, facilitating its application to much larger corpora and making it attractive to a whole community of scholars in periodical studies.

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[1] Matthew Philpotts, 'Dimension: Fractal Forms and Periodical Texture', *Victorian Periodicals Review*, 48 (2015), 402-23.