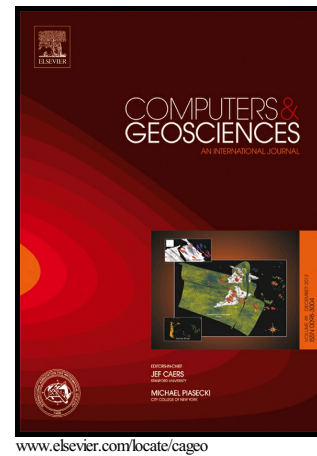


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Peter G. Lelièvre, Melissa Grey



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JMorph: software for performing rapid morphometric measurements on digital images of fossil assemblages

Peter G. Lelièvre^{a,*}, Melissa Grey^{b,**}

^aMemorial University of Newfoundland, St. John's, NL, Canada

^bJoggins Fossil Institute, Joggins, NS, Canada

Abstract

Quantitative morphometric analyses of form are widely used in palaeontology, especially for taxonomic and evolutionary research. These analyses can involve several measurements performed on hundreds or even thousands of samples. Performing measurements of size and shape on large assemblages of macro- or microfossil samples is generally infeasible or impossible with traditional instruments such as vernier calipers. Instead, digital image processing software is required to perform measurements via suitable digital images of samples. Many software packages exist for morphometric analyses but there is not much available for the integral stage of data collection, particularly for the measurement of the outlines of samples. Some software exists to automatically detect the outline of a fossil sample from a digital image. However, automatic outline detection methods may perform inadequately when samples have incomplete outlines or images contain poor contrast between the sample and staging background. Hence, a manual digitization approach may be the only option. We are not aware of any software packages that are designed specifically for efficient digital measurement of fossil assemblages with numerous samples, especially for the purposes of manual outline analysis. Throughout several previous studies, we have developed a new software tool, JMorph, that is custom-built for that task. JMorph provides the means to perform many different types of measurements, which we describe in this manuscript. We focus on JMorph's ability to rapidly and accurately digitize the outlines of fossils. JMorph is freely available from the authors.

Keywords: Fossils, Java, Morphometrics, Photography

1. Introduction

Morphometrics is the quantitative analysis of form (size and shape). Morphometric analyses are widely used in palaeontology, especially for taxonomic and evolutionary research. Data analyses such as Fourier (e.g. Crampton, 1995; Haines and Crampton, 2000) and landmark (e.g. Stempien et al., 2001), and other traditional morphometric techniques (e.g. Strauss and Bookstein, 1982; Bookstein et al., 1985; Kowalewski et al., 1997; Marko and Jackson,

*Principal corresponding author

**Corresponding author

Email addresses: plelievre@mun.ca (Peter G. Lelièvre), curator@jogginsfossilcliffs.net (Melissa Grey)

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