

A Compression Generation Tool
(Technical Report)

Causes of Path Dependence
(STS Research Paper)

An Undergraduate Thesis Portfolio
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by

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Preface

How may the efficiency of engineered systems be improved? The efficiency of sociotechnical systems is constrained both by physical constraints, such as size limits, and by social impediments, such as path dependency.

How may computing network efficiencies be improved? Physical limits on hardware speed compel better use of existing computational resources. If string metric algorithms could operate on compressed strings, they could serve this purpose. Compression-aware algorithms operate on compressed data without decompressing it, thereby saving resources. A string metric algorithm quantifies the difference between two pieces of data. After efforts to find a compression-aware algorithm for a specific string metric failed, a more general approach was taken in which multiple string metrics were analyzed against the compression ratios of the strings in question. Under the LZ-78 compression scheme, a system was devised for generating a string of a desired length and compression ratio. Although this system has only been used in cursory analysis of three string metrics thus far, it can help identify candidate string algorithms in future compression-aware work.

How do social factors impede the adoption of advantageous standards innovations? Path dependence may deter adoption of a superior standard, despite its practical advantages, in part because the short-term cost of conversion may exceed the short-term benefit. Case studies of the Dvorak Simplified Keyboard, the Jankó musical keyboard, and the IPv6 internet addressing scheme indicate that besides such short-term bias, barriers in communication also contribute to path dependence.

List of Contents

1. Preface
2. Technical Report: A Compression Generation Tool
3. STS Research Paper: Causes of Path Dependence
4. Prospectus