Creating Small Unit Based Glyph Visualisations

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Abstract

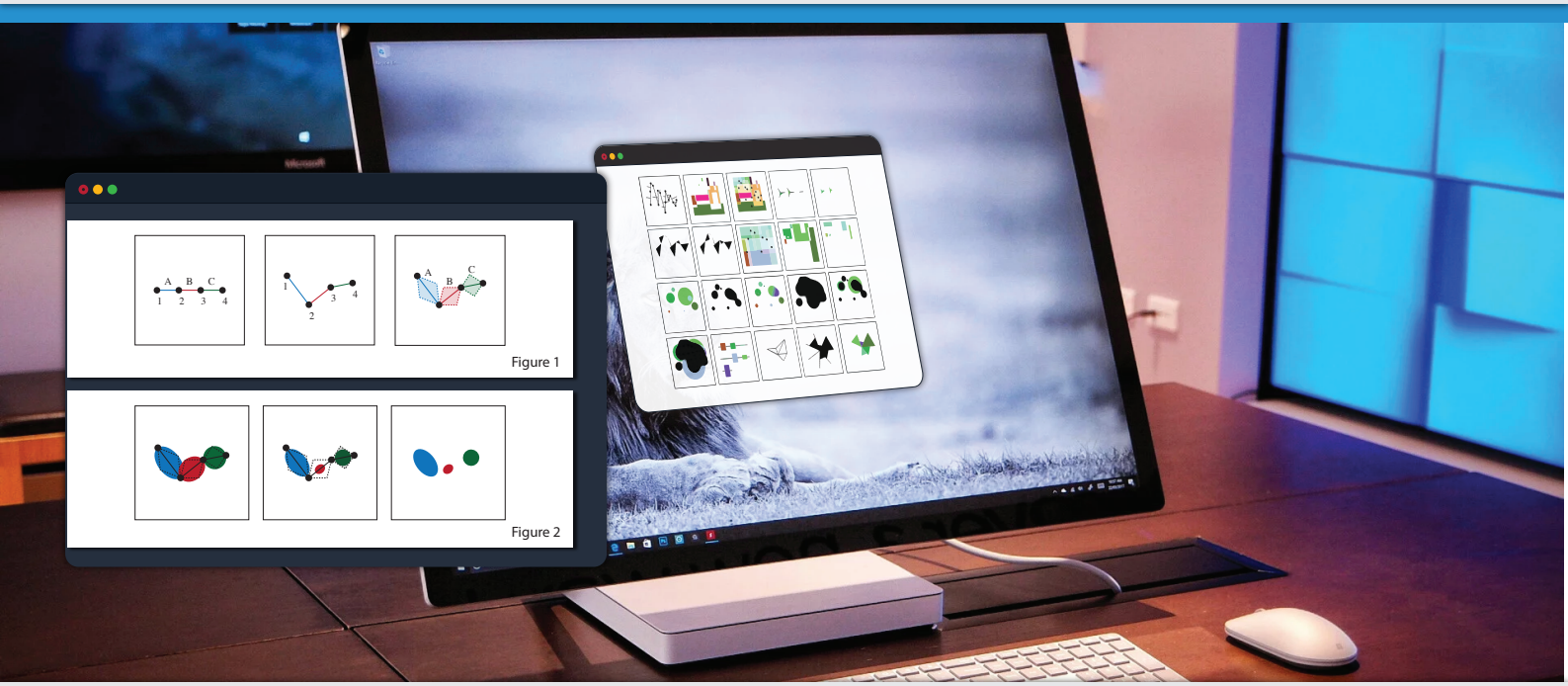
Many modern day tasks involve the use of small screens, where users want to see a summary visualisation of an activity. For example, a runner using a smart watch needs to quickly view their progress, heart rate, comparison to previous races, etc. Subsequently, there is a need to portray data to users in small, yet well-defined, spaces. We define this space to be a single self-contained ``unit''. In this paper we introduce a glyph visualisation algorithm that creates a diverse range of visualisation designs; each design contains many separate parts, whereupon different parameters can be mapped.

Our algorithm uses a path based approach which allows designers to create deterministic, yet unique designs, in a unit space to display multivariate data.

Background

There is a growing need for the effective portrayal of data in visual form on mobile and small screen devices [1]. Patterson [2] posits that the primary objective of information design is to offer clear communication of data. As such we must strive to create visualisations which are well designed and produced and, ultimately, well interpreted. One of our motivating use-cases is that the glyph would be displayed in the full smart watch screen; glyphs with separate parts is suitable here, because the bevel of the watch visually encloses the glyph design. When our glyph is placed alongside other information we would need to ensure that our glyph is visually separable from its background. Subsequently, we define our designs to be small unit based glyph visualisations.

The portrayal of information within our "glyph units" can be achieved through visual variables, including texture, size, shape, value, orientation and colour [3].



Usage

We introduce a path based algorithm for the creation of small unit based glyph visualisations. The model creates a path upon which glyph elements are placed.

The path is constructed with each point pair representing a single element within a given dataset. Points can be placed stochastically or in a manner which represents some part(s) of the dataset as showing in Figure 1.

Once the path is created, elements of the visualisation are placed along the path. We define the region that elements can be placed as an envelope. An example envelope can be seen in Figure 2

As illustrated in Figure 2 these elements can then be adjusted according to Bertin's visual variables to represent the data points within the dataset.

Discussion and Conclusions

This work is part of a large project investigating how glyphs can be displayed on mobile tablets and small screen devices, such as smartwatches. We believe that it is vital to have a consistent design strategy for glyph generation, and it is essential to allow glyphs to have non-connected elements. Our path based design strategy outlined in this work allows developers to create glyphs quickly and easily while maintaining a rigid structure and pattern. Adoption of this method would allow users already familiar with path-based languages (such as SVG path) to quickly and easily understand and create new visualisations.

Our current implementation is limited to a random path generation and depiction of data through colour and size. In the future, we would like to investigate the use of further visual variables as well as the scale within which the visualisations remain effective. Furthermore, we are exploring the effectiveness of the generated glyphs in terms of suitability, reliability and desirability.

References

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This work is funded by KESS 2. Knowledge Economy Skills Scholarships (KESS 2) is a pan-Wales higher level skills initiative led by Bangor University on behalf of the HE sector in Wales. It is part funded by the Welsh Governments European Social Fund (ESF) convergence programme for West Wales and the Valleys