# Exploratory Visualisations for Mapping Conflict in the Syrian Civil War

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## 1 Proposal

### 1.1 Domain and Task

The visualisations that are to be produced for G53IVP (Information Visualisation Project) will be based around conflict mapping the Syrian Civil War. The proposed Information Visualisation application will aim to map and spatially represent conflict between the various factions involved and the battles fought during the Syrian Civil War. An increase in reporting, social media usage and modern technology has opened opportunities for more in-depth statistics to be formed and for accurate and larger datasets to be produced.

The task outlined as part of the project is to produce a visualisation capable of representing the scale, sides and outcomes of the dataset to produce insights as to conflict locations and effects. (See section 1.2 or information on which dataset was chosen).

### 1.2 Proposed Dataset

The proposed dataset is that of the Uppsala Conflict Data Program (UCDP) [SM13] at the department of Peace and Conflict Research at Uppsala University. The dataset is the oldest ongoing data collection project for civil wars, with the history spanning almost 40 years [SM13]. One downloadable format of this data is the disaggregated dataset with georeferences for the Syrian conflict spanning the years between 2016-2019 [Sti19].

The dataset is provided in a variety of formats including CSV, Excel and R and therefore is highly analysable through a variety of applications. In addition to this the disaggregated nature of this means that clustering can be performed by the application - thus producing more insightful visualisations.

## 2 Information Visualisation Solution

The solution of visualising this dataset is to produce a highly interactive website for geospatial visualisation techniques such as heatmaps [GW12] and voronoi maps [AK00] to be showcased. In addition to

this, once a selection is made an in depth showcase will be shown through the interactive nature of the website. This sub-section (depending on time scales) will present more traditional mapping techniques such as line or pie charts depending on the research questions which are decided.

### 2.1 Proposed Tools

At present the plan is to complete the project using React.JS [Rea20] with the exploratory data analysis being produced using deck.gl [dec20]. React will be used to produce an interactive user interface, with deck.gl being used to implement WebGL powered visualisations in a geospatial setting. Using React will allow the platform to published as a website, and used by any WebGL-compatible device.

### 2.2 Related Work

Previous work such as that the visualisation of spatial and temporal new stories [SLBK17] had a specific focus on that of the Syrian Civil war, but had little geospatial visualisation involved. Additionally the Syrian Refugee Visualisation book has many geospatial and more traditional graphs [Ass17] - however has no interactivity and many of such charts and graphs are produced through third party sources.

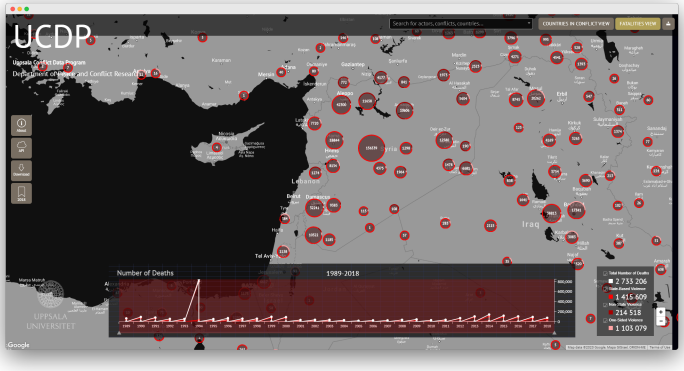


Figure 1: The current visualisations used as part of the UCDP dataset [Sti19].

At present the only visualisation produced using this dataset is shown in Figure 1, the visualisation has limited interactivity with the map often being slow or not-responding. The proposal within this document will aim to improve upon these results, by producing a more structured visualisation - however the method of clustering results and the visualisation of this will be further explored.

## 3 Project Plan

**Work Package 1 - Initial Formatting** 28/02/2020

As part of this work package, the basic layout of the website will be produced using React - and all external libraries will be loaded in.

**Work Package 2 - Concept Geospatial Visualisation** 10/03/2020

The concept interactive visualisation will be produced, allowing locations and geo-regions to be clicked on and selected.

**Work Package 3 - Location Details Visualisation** 31/03/2020

The core geospatial visualisation will be implemented using deck.gl and the individual location statistics will have began work.

**Work Package 4 - Code Complete, Documentation Started** 30/04/2020

At this point the finishing touches will have been implemented on the website, and the documentation will be mostly complete - ready for submission.

**Work Package 5 - Report, Documentation and Presentation Complete** 08/05/2020

The report, documentation and the presentation will be completed and submitted. The code will also be submitted at this point.

## References


[AK00] Franz Aurenhammer and Rolf Klein. Voronoi diagrams. *Handbook of computational geometry*, 5(10):201–290, 2000.

[Ass17] Maaria Mohammad Assami. *Outsiders, Everywhere: Humanizing Syrian Refugee Visualizations*. PhD thesis, Northeastern University, 2017.

[dec20] Large-scale webgl-powered data visualization, 2020.

[GW12] Nils Gehlenborg and Bang Wong. Points of view: heat maps, 2012.

[Rea20] React – a javascript library for building user interfaces, 2020.

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[SM13] Ralph Sundberg and Erik Melander. Introducing the ucdp georeferenced event dataset. *Journal of Peace Research*, 50(4):523–532, 2013.

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