**Treatment History Explorer Application**

**Background**

The application uses (simulated) data of patient drug treatment histories and provides a number of different types of interactive visualisations from time of diagnosis. The main aim of the analysis is to show how stable treatment pathways are across time. In the case where treatments where not ideal or guidelines are poor we might expect patients to change drugs frequently. In cases where guidelines are good and / or treatments are successful we might expect treatment pathways to remain stable with little change in treatments.

**Usage Instructions**

One the left hand panel there are a number of controls, which are described below from top to bottom.

**Select Sub Sample Size**

This slider allow you to select the number of the randomly selected sub sample of patients for sequence sub sample visualisation (see details of visualisations below)

**Selection of Age Ranges**

This slider allows the user to select the age group to be shown in the visualisations. There are two sliders, one for the minimum age and one for the maximum age in the selected age range.

**Gender**

These radio buttons allow you to create a sub sample of only males, only females or both.

**Severity Group**

The condition in question is clinically present with two recognised levels of severity; the radio button allows you select the sub sample of only mild or only severe or both levels of severity

**Analysis Type**

The drop down box allows the user to select five different types of visualisation which are detailed below.

**Sequence Sub Sample**

The sequence sub sample draws a randomly selected number of patient treatment histories (vertical axis) and plot the current treatment at each day since time of diagnosis (horizontal axis). Different drugs are represented with different colours. The size of the sub sample is selected in the select sub sample size slider in the left panel.

**Frequency**

This visualisation shows the most frequent patterns of treatment for the selected patient group. With percent of all patients on the vertical axis and time since diagnosis on the horizontal axis. Only the most frequent patterns are shown

**Entropy**

This visualisation plots the entropy of the treatment patterns for the entire selected population, with time since diagnosis on the horizontal axis.

**Turbulence**

This visualisation plots the Turbulence of the treatment patterns for the entire selected population with time since diagnosis on the horizontal axis.

**Cluster**

Uses hierarchical clustering to show the ‘relatedness’ of the treatment histories in the selected patient population

**Possible Error Messages**

***Error: Undefined columns selected.***

This will usually occur when the age range, gender, severity selections result in too few or no patient being present in the sub sample. In this case the selections should be adjusted to allow a sufficient sample of patients to visualise.

***Error: cannot take a sample larger than the population when 'replace = FALSE'***

This error message occurs when the sub sample selected in the ‘Select Sub Sample Size’ slider, is larger than the pool of patient treatment histories from which the sample is to be drawn. For example trying to show a sub sample of 300 patient records when there are only 200 records available.

**Note on future development**

Eventually slider values will be adjusted to automatically adapt the possible selections so that error messages cannot occur.

Error messages will be made more users friendly and informative, instructing the user to adjust settings to correct.

A tab with options for basic visualisation of patient demographics of the selected population will be added.

Comparative visualisations between different selected patient groups will be added