**GUI User Testing**

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| **Run GUI** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Run GUI with valid data file available | GUI opens in a maximized window with three buttons visible with help text. Map loads with no GPS markers visible | GUI opens in a maximized window with three buttons visible with help text. Map loads with no GPS markers visible | Functioning as expected |
| Run GUI with no data file available | GUI does not open | GUI does not open | Functioning as expected |

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| **Pre-Prediction Resize window** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Click maximize button when maximized | Window resizes to smaller version. Buttons and map scale and retain aspect ratio | Window resizes to smaller version. Buttons and map scale and retain aspect ratio | Functioning as expected |
| Change width of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Functioning as expected |
| Change height of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Functioning as expected |
| Change height and width of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps | Functioning as expected |
| Attempt to resize to a very small window | Window resizes, buttons and map shrink but map retains aspect ratio with white space filling any gaps. At a certain point, window size cannot be reduced further | Window resizes, buttons and map shrink but map retains aspect ratio with white space filling any gaps. At a certain point, window size cannot be reduced further | Functioning as expected |
| Click maximize button when not maximized | Window resizes to fit screen, buttons and map stretch but map retains aspect ratio with white space filling any gaps | Window resizes to fit screen, buttons and map stretch but map retains aspect ratio with white space filling any gaps | Functioning as expected |

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| **‘Select Date’ button – initial interaction (no other buttons selected)** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| ‘Select Date’ button clicked | Calendar appears with today’s date selected. Future dates are ‘greyed out’ to indicate they are not valid selections. No other changes. | Calendar appears with today’s date selected. Future dates are ‘greyed out’ to indicate they are not valid selections. No other changes. | Functioning as expected |
| Today’s date selected from calendar – data is in data file | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Functioning as expected |
| Today’s date selected from calendar – data is not in data file | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Functioning as expected |
| Past date selected from calendar – data is in data file | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Functioning as expected |
| Past date selected from calendar – data is not in data file | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Functioning as expected |
| Future date selected from calendar – data is in data file | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Functioning as expected |
| Future date selected from calendar – data is not in data file | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Calendar disappears. Error message appears informing user there is no data for the date selected. Date button sets text to ‘Select Date’ if not already set. No other changes. | Functioning as expected |
| ‘Select Date’ button clicked twice | Calendar appears on first click and disappears on second click. No other changes. | Calendar appears on first click and disappears on second click. No other changes. | Functioning as expected |
| New date selected after different date has already been selected. | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Calendar disappears and ‘select date’ button text changes to date selected. No other changes. | Functioning as expected |

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| **‘No data for date selected’ error message displayed** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Click ok on error message | Error message window disappears. No other changes. | Error message window disappears. No other changes. | Functioning as expected |
| Error message closed via ‘cross’ | Error message window disappears. No other changes. | Error message window disappears. No other changes. | Functioning as expected |
| Click anywhere else on screen. | Error message remains on screen. No other changes. | Error message remains on screen. No other changes. | Functioning as expected |

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| **‘Select Model’ button – initial interaction (no other buttons selected)** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| ‘Select Model’ button clicked | Dropdown menu appears with list of available machine-learning models | Dropdown menu appears with list of available machine-learning models | Functioning as expected |
| Model selected from list | Dropdown menu disappears. Text of button changes to that of the name of the selected model. No other changes. | Dropdown menu disappears. Text of button changes to that of the name of the selected model. No other changes. | Functioning as expected |
| Model selected from list after model selected previously | Dropdown menu disappears. Text of button changes to that of the name of the selected model. No other changes. | Dropdown menu disappears. Text of button changes to that of the name of the selected model. No other changes. | Functioning as expected |
| ‘Select Model’ button clicked twice | Dropdown menu remains visible with list of available machine-learning models | Dropdown menu remains visible with list of available machine-learning models | Functioning as expected |

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| **‘Select Feature Set’ button – initial interaction (no other buttons selected)** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| ‘Select Feature Set’ button clicked | Dropdown menu appears with list of available feature sets | Dropdown menu appears with list of available feature sets | Functioning as expected |
| Model selected from list | Dropdown menu disappears. Text of button changes to that of the name of the feature set selected. No other changes. | Dropdown menu disappears. Text of button changes to that of the name of the feature set selected. No other changes. | Functioning as expected |
| Model selected from list after model selected previously | Dropdown menu disappears. Text of button changes to that of the name of the feature set selected. No other changes. | Dropdown menu disappears. Text of button changes to that of the name of the feature set selected. No other changes. | Functioning as expected |
| ‘Select Feature Set’ button clicked twice | Dropdown menu remains visible with list of available machine-learning models | Dropdown menu remains visible with list of available machine-learning models | Functioning as expected |

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| **Making Predictions (Selecting all three buttons)** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Select valid date, then valid model, then valid feature set | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid date, then valid feature set, then valid model | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid model, then valid feature set, then valid date | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid model, then valid date, then valid feature set | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid feature set, then valid date, then valid model | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid feature set, then valid model, then valid date | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Button texts update accordingly. On third button being selected, ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| All three buttons set, prediction already made. Date button changed to different valid date. | Date button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Date button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| All three buttons set, prediction already made. Model button changed to different valid model. | Model button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Model button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| All three buttons set, prediction already made. Feature set button changed to different valid feature set. | Feature set button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Feature set button text updates accordingly. Previous text predictions disappear and map clears. ‘Calculating…’ text appears briefly and is then replaced by ‘Hotspot predictions’, followed by a list of fifteen neighbourhoods and their predicted crime figures. Correct predictions are coloured green. Incorrect predictions are coloured red. The map image is populated with 15 new GPS locations, each of which corresponds to a neighbourhood in the list. | Functioning as expected |
| Select valid date, then valid model, then invalid feature set | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. ‘Calculating…’ sometimes never visible to human eye due to speed of error message appearing. This is perfectly acceptable. |
| Select valid date, then valid feature set, then invalid model | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. |
| Select valid model, then valid feature set, then invalid date | ‘No data found’ error message displayed. No other changes. | ‘No data found’ error message displayed. No other changes. | Functioning as expected. |
| Select valid model, then valid date, then invalid feature set | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. |
| Select valid feature set, then valid date, then invalid model | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | All button texts update accordingly. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. |
| Select valid feature set, then valid model, then invalid date | ‘No data found’ error message displayed. No other changes. | ‘No data found’ error message displayed. No other changes. | Functioning as expected. |
| All three buttons set, prediction already made. Date button changed to invalid date. | Previous text predictions disappear and map clears. ‘Select Date’ button text reverts to helper text. ‘No data found’ error message displayed. No other changes. | Previous text predictions disappear and map clears. ‘Select Date’ button text reverts to helper text. ‘No data found’ error message displayed. No other changes. | Functioning as expected. |
| All three buttons set, prediction already made. Model button changed to invalid model. | Previous text predictions disappear and map clears. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Previous text predictions disappear and map clears. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. |
| All three buttons set, prediction already made. Feature set button changed to invalid feature set. | Previous text predictions disappear and map clears. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Previous text predictions disappear and map clears. ‘Calculating…’ text briefly appears before disappearing and ‘loading model failed’ error message box appears. No other changes. | Functioning as expected. |

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| **‘Loading model failed’ error message displayed** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Click ok on error message | Error message window disappears. No other changes. | Error message window disappears. No other changes. | Functioning as expected |
| Error message closed via ‘cross’ | Error message window disappears. No other changes. | Error message window disappears. No other changes. | Functioning as expected |
| Click anywhere else on screen. | Error message remains on screen. No other changes. | Error message remains on screen. No other changes. | Functioning as expected |

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| **Post-Prediction Resize window** | | | |
| **Action** | **Expected Result** | **Actual Result** | **Comments** |
| Click maximize button when maximized | Window resizes to smaller version. Buttons and map scale and retain aspect ratio. GPS markers reposition correctly. Prediction text remains visible. | Window resizes to smaller version. Buttons and map scale and retain aspect ratio. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |
| Change width of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |
| Change height of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |
| Change height and width of window | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Window resizes, buttons and map stretch/shrink but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |
| Attempt to resize to a very small window | Window resizes, buttons and map shrink but map retains aspect ratio with white space filling any gaps. At a certain point, window size cannot be reduced further. GPS markers reposition correctly. Prediction text remains visible. | Window resizes, buttons and map shrink but map retains aspect ratio with white space filling any gaps. At a certain point, window size cannot be reduced further. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |
| Click maximize button when not maximized | Window resizes to fit screen, buttons and map stretch but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Window resizes to fit screen, buttons and map stretch but map retains aspect ratio with white space filling any gaps. GPS markers reposition correctly. Prediction text remains visible. | Functioning as expected |