The invention claimed is:

1. A computer implemented method of identifying a changed element within a target web page, comprising the step of:

identifying within a pre-region of the target web page a pre-region longest matching segment of the pre-region that matches a pre-region segment of a pre-region of a source web page, where the target web page comprises at least one change as compared to the source web page, the pre-region of the source web page comprises an area of the source web page before an encoded position of a sought element in the source web page, the pre-region of the target web page comprises an area of the target web page before the encoded position in the target web page;

identifying within a post-region of the target web page a post-region longest matching segment of the post-region that matches a post-region segment of the post-region of the source web page, where the post-region of the source web page comprises an area of the source web page after the encoded position, the post-region of the target web page comprises an area of the target web page after the encoded position in the target web page;

determining the pre-region longest matching segment is within a pre-defined distance of the post-region longest matching segment;

identifying the changed element in the target web page that is between the pre-region longest matching segment and the post-region longest matching segment in response to the pre-region longest matching segment being determined to be within the pre-defined distance of the post-region longest matching segment.

2. The method of claim 1, comprising the steps of:

before the step of determining, determining the pre-region longest matching segment is not within the pre-defined distance of the post-region longest matching segment;

in response to determining the pre-region longest matching segment is not within the pre-defined distance of the post-region longest matching segment,

reducing a size of the pre-region of the source web page by excluding the pre-region longest matching segment from the pre-region of the source web page;

reducing a size of the pre-region of the target web page by excluding the pre region longest matching segment from the pre-region of the target web page;

reducing the size of the post-region of the source web page by excluding the post-region longest matching segment from the post-region of the source web page;

reducing the size of the post-region of the target web page by excluding the post-region longest matching segment from the post-region of the target web page;

repeating at least the steps of:

identifying within the pre-region of the target web page the pre-region longest matching segment; and,

identifying within the post-region of the target web page the post-region longest matching segment.

3. The method of claim 1, wherein the step of determining comprises the step of proceeding, starting with the pre-region longest matching segment not within the pre-defined distance of the post-region longest matching segment, to reduce a size of the pre-region of the source web page and of the pre-region of the target web page by excluding the pre-region longest matching segment from the pre-region of the source web page and the pre-region of the target web page and to reduce a size of the post region of the source web page and a size of the post-region of the target web page by excluding the post-region longest matching segment from the post-region of the source web page and the post-region of the target web page, with the reduced pre-regions and the reduced post-regions acting as an initial value for a next iteration, until the pre-region longest matching segment is within the pre-defined distance of the post-region longest matching segment.

4. The method of claim 1, comprising the step of position encoding the source web page and position encoding the target web page, wherein the encoded position of the sought element in the source web page is an encoded position index of the sought element, the pre-region of the source web page is an area of the source web page before the encoded position index of the sought element in the source web page, the post-region of the source web page is an area of the source web page after the encoded position index, the pre-region of the target web page is an area of the target web page before the encoded position index, and the post-region of the target web page is an area of the target web page after the encoded position index.

5. The method of claim 1, comprising the step of type encoding the source web page and the target web page, and wherein

the pre-region longest matching segment is a pre-region longest matching segment of encoded values, and

the post-region longest matching segment is a longest matching segment of encoded values, and

the step of identifying within a pre-region of the target web page a pre-region longest matching segment is further defined in that the encoded values of the pre-region of the target web page are compared to the encoded values of the pre-region of the source web page to identify the pre-region longest matching segment of encoded values of the pre-region that matches a pre-region segment of encoded values of the pre-region of the source web page; and,

the step of identifying within a post-region of the target web page a post-region longest matching segment is further defined in that the encoded values of the post-region of the target web page are compared to the encoded values of the post-region of the source web page to identify a post-region longest matching segment of encoded values of the post-region of the target web page that matches a post-region segment of encoded values of the post region of the source web page.

6. The method of claim 5, wherein the step of type encoding is further defined in that opening tags are assigned a first encoding value, closing tags are assigned a second encoded value, and tags which do not have a closing tag by default are assigned a third encoded value, and wherein the step of type encoding results in a sequence of encoded values for the source web page corresponding to a sequence of tags within the source web page, and a sequence of encoded values for the target web page corresponding to a sequence of tags within the target web page.

7. The method of claim 6, wherein the step of type encoding is further defined in that the target web page comprises HTML code and the source web page comprises HTML code.

8. The method of claim 5, comprising the steps of tokenizing the source web page by creating an ordered list of tags of the source web page, and tokenizing the target web page by creating an ordered list of tags of the target web page.

9. The method of claim 1, comprising the steps of, at least before the step of determining:

identifying a repeated sequence range within the source web page containing repeated sequences of tags,

reducing a size of the pre-region or a size of the post-region to within the repeated sequence range.

10. The method of claim 9, comprising the steps of:

identifying an instance range of an instance of a repeated sequence within the repeated sequence range;

reducing a size of the pre-region or a size of the post-region within the instance range.

11. The method of claim 1, comprising a step of parsing the source web page and the target web page to pair unpaired tags in each of the source web page and the target web page.

12. The method of claim 1, wherein the step of identifying the changed element in the target web page comprises the step of identifying a location of the changed element of the target web page within the target web page.

13. A computer implemented method of identifying a sought element within a target web page as a changed web element, comprising the step of:

comparing a one or more locators known to be associated with the sought element to a one or more locators of a one or more elements of the target web page;

determining that the one or more elements of the target web page are not associated with a locator that uniquely identifies the sought element within the target web page and matches a locator of the one or more locators known to be associated with the sought element; and

in response to said determining,

identifying within a pre-region of the target web page a pre-region longest matching segment of the pre-region that matches a pre-region segment of a pre-region of a source web page, where the target web page comprises at least one change as compared to the source web page, the pre-region of the source web page comprises an area of the source web page before an encoded position of the sought element in the source web page, the pre-region of the target web page comprises an area of the target web page before the encoded position in the target web page;

identifying within a post-region of the target web page a post-region longest matching segment of the post-region that matches a post-region segment of a post-

region of the source web page, where the post-region of the source web page comprises an area of the source web page after the encoded position, the post-region of the target web page comprises an area of the target web page after the encoded position in the target web page;

determining the pre-region longest matching segment is within a pre-defined distance of the post-region longest matching segment; and

identifying the changed web element in the target web page that is between the pre-region longest matching segment and the post-region longest matching segment in response to the pre-region longest matching segment being determined to be within the pre-defined distance of the post region longest matching segment.

14. The method of claim 13, wherein the step of determining the pre-region longest matching segment is within the pre-defined distance of the post-region longest matching segment, comprises the step of proceeding, starting with the pre-region longest matching segment is not within the pre-defined distance of the post-region longest matching segment, to reduce a size of the pre-region of the source web page and of the pre-region of the target web page by excluding the pre-region longest matching segment from the pre-region of the source web page and the pre-region of the target web page and to reduce a size of the post-region of the source web page and of the post-region of the target web page by excluding the post-region longest matching segment from the post-region of the source web page and the post-region of the target web page, with the reduced pre-regions and the reduced post-regions acting as an initial value for a next iteration, until the pre-region longest matching segment is within the pre-defined distance of the post-region longest matching segment.

15. A web element rediscovery system, comprising:

a memory;

a processor in communication with the memory;

a pre-region identifying function executable by the processor to identify within a pre-region of a target web page a pre-region longest matching segment of the pre-region that matches a pre-region segment of a pre-region of a source web page, where the target web page comprises at least one change as compared to the source web page, the pre-region of the source web page comprises an area of the source web page before an encoded position of a sought element in the source web page, the pre-region of the target web page

comprises an area of the target web page before the encoded position in the target web page;

a post-region identifying function executable by the processor to identify within a post-region of the target web page a post-region longest matching segment of the post-region that matches a post-region segment of the post-region of the source web page, the post-region of the source web page comprises an area of the source web page after the encoded position, the post-region of the target web page comprises an area of the target web page after the encoded position in the target web page;

a determining function executable by the processor to determine the pre-region longest matching segment is within a pre-defined distance of the post-region longest matching segment;

a web element identifying function executable by the processor to identify a changed web element in the target web page that is between the pre-region longest matching segment and the post-region longest matching segment in response to the pre-region longest matching segment being determined to be within the pre-defined distance of the post-region longest matching segment.

16. The system of claim 15, wherein determining function comprises a reduction function of proceeding, starting with the pre-region longest matching segment is not within the pre-defined distance of the post-region longest matching segment, to reduce a size of the pre-region of the source web page and of the pre-region of the target web page by excluding the pre-region longest matching segment from the pre-region of the source web page and the pre-region of the target web page and to reduce a size of the post-region of the source web page and of the post-region of the target web page by excluding the post-region longest matching segment from the post-region of the source web page and the post-region of the target web page, with the reduced pre-regions and the reduced post-regions acting as an initial value for a next iteration, until the pre-region longest matching segment is within the pre-defined distance of the post-region longest matching segment.

17. The system of claim 15, comprising an position encoding function stored on the memory and executable by the processor to position encode the source web page and position encoding the target web page, wherein the encoded position of the sought element in the source web page is an encoded position index of the sought element, the pre-region of the source web page is an area of the source web page before the encoded position index of the sought element in the source web page, the post-region of the source web page is an

area of the source web page after the encoded position index, the pre-region of the target web page is an area of the target web page before the encoded position index, the post-region of the target web page is an area of the target web page after the encoded position index.

18. The system of claim 15, comprising a type encoding function stored on the memory and executable by the processor to type encode the source web page and type encode the target web page, and wherein

the pre-region longest matching segment is a pre-region longest matching segment of encoded values and

the post-region longest matching segment is a longest matching segment of encoded values, and

the pre-region identifying function is configured to compare the encoded values of the pre-region of the target web page to the encoded values of the pre-region of the source web page to identify the pre-region longest matching segment of encoded values of the pre - region that matches a pre-region segment of encoded values of the pre-region of the source web page; and,

the post-region identifying function is configured to compare the encoded values of the post-region of the target web page to the encoded values of the post region of the source web page to identify a post-region longest matching segment of encoded values of the post-region of the target web page that matches a post-region segment of encoded values of the post-region of the source web page.

19. The system of claim 18, wherein the type encoding function is further configured to

assign opening tags a first encoding value, closing tags a second encoded value, and tags which do not have a closing tag by default a third encoded value;

produce a sequence of encoded values for the source web page corresponding to a sequence of tags within the source web page; and,

produce a sequence of encoded values for the target web page corresponding to a sequence of tags within the target web page.

20. The system of claim 19, wherein the type encoding function is further configured to encode HTML tags from the target web page comprising HTML code and from the source web page comprising HTML code.

21. The system of claim 18, comprising a tokenization function configured to tokenize the source web page by creating an ordered list of encoded tags of the source web page, and to tokenize the target web page by creating an ordered list of encoded tags of the target web page.

22. The system of claim 15, comprising:

a repeated sequence range identifying executable by the processor to identifying a repeated sequence range within the source web page containing repeated sequences of tags; and,

a region reduction function executable by the processor to reduce a size of the pre-region or a size the post-region to within the repeated sequence range.

23. The system of claim 22, comprising:

an instance range identification function executable by the processor to identify an instance range of an instance of a repeated sequence within the repeated sequence range; and,

a size reduction function executable by the processor to reduce a size of each of the pre-regions or a size of each of the post-regions within the instance range.

24. The system of claim 15, comprising a parsing function executable by the processor to parse the source web page and the target web page to pair unpaired tags in each of the source web page and the target web page.

25. The system of claim 15, wherein the web element identifying function is further configured to identifying a location of the changed web element of the target web page within the target web page.

26. The system of claim 15, wherein the pre-region identifying function, the post-region identifying function, the determining function, and the web element identifying function are stored in the memory.

27. A web element rediscovery computer system, comprising:

a memory;

a processor in communication with the memory;

a comparing function executable by the processor to compare a one or more locators known to be associated with a sought element to a one or more locators of a one or more elements of a target web page; and

a first determining function executable by the processor to determine whether the one or more elements of the target web page are associated with a locator that uniquely identifies the sought element within the target web page and matches a locator of the one or more locators known to be associated with the sought element;

a pre-region identifying function executable by the processor to identify within a pre-region of the target web page a pre-region longest matching segment of the pre-region that matches a pre-region segment of a pre-region of a source web page, where the target web page comprises at least one change as compared to the source web page, the pre-region of the source web page comprises an area of the source web page before an encoded position of the sought element in the source web page, the pre-region of the target web page comprises an area of the target web page before the encoded position in the target web page;

a post-region identifying function executable by the processor to identify within a post-region of the target web page a post-region longest matching segment of the post-region that matches a post-region segment of the post-region of the source web page, where the post-region of the source web page comprises an area of the source web page after the encoded position, the post-region of the target web page comprises an area of the target web page after the encoded position in the target web page;

a second determining function executable by the processor to determine the pre-region longest matching segment is within a pre-defined distance of the post-region longest matching segment; and

a web element identifying function executable by the processor to identify a changed web element in the target web page that is between the pre-region longest matching segment and the post-region longest matching segment in response to the pre-region longest matching segment being determined to be within the pre-defined distance of the post-region longest matching segment.

28. The system of claim 27, wherein the second determining function comprises a reduction function executable by the processor to proceed, starting with the pre-region longest matching segment is not within the pre-defined distance of the post-region longest matching segment, to reduce a size of the pre-region of the source web page and of the pre-region of the target web page by excluding the pre-region longest matching segment from the pre-region of the source web page and the pre-region of the target web page and to reduce a size of the post-region of the source web page and of the post-region of the target web page by excluding the post-region longest matching segment from the post-region of the source web page and the post-region of the target web page, with the reduced pre-regions and the reduced post-regions acting as an initial value for a next iteration, until the pre-region longest matching segment is within the pre-defined distance of the post-region longest matching segment.

29. The system of claim 27, comprising an position encoding function stored on the memory and executable by the processor to position encode the source web page and position encoding the target web page, wherein the encoded position of the sought element in the source web page is an encoded position index of the sought element, the pre-region of the source web page is an area of the source web page before the encoded position index of the sought element in the source web page, the post-region of the source web page is an area of the source web page after the encoded position index, the pre region of the target web page is an area of the target web page before the encoded position index, the post-region of the target web page is an area of the target web page after the encoded position index.

30. The system of claim 27, wherein comparing function is further defined in that the one or more locators known to be associated with the sought element and the one or more locators of the one or more elements of the target web page each comprise an attribute of an html tag.

31. The system of claim 27, wherein comparing function is further defined in that the one or more locators known to be associated with the sought element and the one or more locators of the one or more elements of the target web page each comprise an Xpath of an html tag.

32. The system of claim 27, wherein comparing function is further defined in that the one or more locators known to be associated with the sought element and the one or more locators

of the one or more elements of the target web page each comprise a CSS selector associated with an html tag.

33. The system of claim 27, wherein comparing function is further defined in that the one or more locators known to be associated with the sought element and the one or more locators of the one or more elements of the target web page each comprise an image associated with an html tag.

34. The system of claim 33, wherein comparing function is further defined in that a perceptual hash value of the image of the one or more elements of the target web page is compared to at least one perceptual hash value of the image known to be associated with the sought element.