

CLAIMS

1. A method comprising:
receiving, with a computing system, data representing a video item into a buffer;
outputting, with the computing system, the video item from the buffer to a display system;
determining, with the computing system, that utilization of the buffer falls below a predetermined threshold;
in response to determining that the utilization of the buffer falls below the predetermined threshold, determining, with the computing system, that there is a specified rebuffering point within a predetermined time frame, the specified rebuffering point being selected from among a plurality of potential rebuffering points within the video item, the plurality of potential rebuffering points comprising different types of rebuffering points that are assigned different ranking values, such that the highest ranked rebuffering point is selected as the specified rebuffering point; and
pausing, with the computing system, the video item at the specified rebuffering point in response to determining that there is the specified rebuffering point within the predetermined time frame.
2. The method of claim 1, further comprising resuming the video item after a predetermined amount of time, the predetermined amount of time being based on a rate at which the video item is received by the buffer.
3. The method of claim 1, wherein the specified rebuffering point corresponds to one of: a shot change and a scene change.
4. The method of claim 1, wherein the specified rebuffering point corresponds to a in which a frame motion value is below a predetermined motion value threshold.
5. The method of claim 1, wherein the specified rebuffering point corresponds to a point at which values representing visual properties are below a predefined visual property threshold.

6. The method of claim 1, wherein the specified rebuffering point is a pause in a dialogue of the video item.
7. The method of claim 6, wherein the pausing the video item occurs only if the specified rebuffering point is above a specific rank.
8. The method of claim 1, wherein the specified rebuffering point is identified within the video item before the video item is streamed to the computing system.
9. The method of claim 1, wherein the specified rebuffering point is identified by the computing system while a portion of the video item in which the specified rebuffering point is positioned is within the buffer.
10. A method comprising:
 - receiving, with a computing system, first data representing a video item into a buffer and second data indicating a set of specified rebuffering points for the video item;
 - outputting, with the computing system, the first data representing the video item from the buffer to a display system;
 - determining that a rate at which the first data is received is less than a rate at which the first data is output from the buffer to the display system by a threshold amount; and
 - in response to determining that the rate at which the first data is received is less than the rate at which the first data is output to the display system by the threshold amount, pausing the media stream at a rebuffering point selected from the set of specified rebuffering points, the set of potential rebuffering points comprising different types of rebuffering points that are assigned different ranking values, such that the highest ranked rebuffering point is used as the selected rebuffering point.
11. The method of claim 10, wherein the set of specified rebuffering points includes shot changes, scene changes, scenes with predefined visual characteristics, and pauses in dialogue.

12. The method of claim 10, wherein a period of time for which the video item is paused is based on a prediction of when the buffer will be below a predetermined value.

13. The method of claim 11, wherein different types of rebuffering points are assigned different rankings.

14. The method of claim 13, wherein the one of the set of specified rebuffering points is selected based on a difference the rate at which the first data is received and the rate at which the first data is output from the buffer to the display system.

15. The method of claim 13, further comprising pausing the media stream at a plurality of rebuffering points of the set of rebuffering points, wherein a pause at each of the plurality of selected rebuffering points is for a different period of time based on a ranking value assigned to that rebuffering point.

16. The method of claim 14, wherein a subset of acceptable rebuffering points from which the selected rebuffering point is selected includes additional types of rebuffering points as the difference increases.

17. A method of optimizing placement of a rebuffering event in steaming media playback, the method comprising:

receiving, with a server computing system, a streaming video item;

performing image processing to identify a plurality of specified rebuffering points in the steaming video item, the plurality of specified rebuffering points comprising different types of rebuffering points that are assigned different ranking values;

storing, in a memory, information characterizing the identified plurality of specified rebuffering points; and

transmitting the information characterizing the identified plurality of specified rebuffering points over a network to a client computing system, such that the streaming video item is rebuffered at a selected highest ranked rebuffering point.

18. The method of claim 17, wherein the information characterizing the identified plurality of specified rebuffering points includes at least one of: timestamps and frame numbers associated with a specified rebuffering point and a tag indicating a rebuffering point type associated with each specified rebuffering point.

19. The method of claim 17, further comprising transmitting the streaming video item to the client computing system, wherein transmitting the streaming video item is performed in connection with the transmitting the information characterizing the identified plurality of specified rebuffering points.