gaming machine as part of the game outcome presentation. Apparatus and methods are described for generating and displaying information in a textual format that is compatible with a 3-D graphical rendering system. In particular, font generation and typesetting methods that are applicable in a 3-D gaming environment are described.

[0012] One aspect of the present invention provides a method of providing a game of chance in a gaming machine that is operable i) to receive cash or indicia of credit for a wager on a game of chance and ii) to output cash or an indicia of credit as an award for the game of chance where the gaming machine comprises a master gaming controller, a display device, a memory device and a 3-D graphical rendering system. The method may be generally characterized as comprising: a) receiving the wager for the games of chance controlled by the master gaming controller on the gaming machine; b) determining a game outcome the games of chance; c) rendering one or more two-dimensional images derived from three-dimensional (3-D) objects in a 3-D gaming environment stored in the memory device on the gaming machine wherein at least one of the 3-D objects is a 3-D text object adapted for conveying textual information; and d) displaying the one or more rendered two-dimensional images to the display device on the gaming machine. In general, the 3-D gaming environment comprises a plurality of 3-D text objects and the 3-D graphical rendering system may be compatible with OpenGL.

[0013] In particular embodiments, the method may further comprise: a) mapping a text string comprising one or more alphanumeric characters to the 3-D text object where the 3-D text object may be configured to convey at least one of the alphanumeric characters in the text string, b) mapping textures with patterns of alphanumeric characters to the 3-D text object to convey the textual information, c) modeling the 3-D text object in a shape of an alphanumeric character to convey the textual information. The shape of the alphanumeric character may be defined by a plurality of parameterized curves.

[0014] In other embodiments, the method may further comprise scaling the 3-D text object for conveying the textual information by a scaling factor. The 3-D gaming environment may comprises two or more 3-D text objects where the gaming machine is operable to apply a different scale factor to each of the two or more 3-D text objects. The scaling factor may vary as a function of time. The 3-D text object may be scaled in less three of its dimensions. Further, the gaming machine may be operable to apply a different scale factor to each of the three dimensions of the 3-D text object. The 3-D text object may be scaled using mip mapping.

[0015] In yet other embodiments, the gaming machine may be operable to scale a plurality of 3-D text objects to fit to a bounding surface. A shape of the bounding surface may change as a function of time. In one example, the bounding surface may be a planar surface. A shape of the 3-D text objects change may also change as a function of time.

[0016] In particular embodiments, the method may further comprise positioning each of the 3-D objects in the 3-D gaming environment. The position of one or more of the 3-D objects may change as a function of time. A plurality of the 3-D text objects may be positioned along a straight line, two or more parallel lines or along a 3-D curve in the 3-D gaming environment. In general, a plurality of 3-D text objects may be positioned in the 3-D gaming environment.

[0017] In one embodiment, the method may further comprise guiding a placement of the 3-D text objects using a text page surface. One or more of a shape of the text page surface, a position of the text page surface or an orientation of the text page surface may change as a function of time. A shape of the text page surface may be a planar rectangle, a planar multisided polygon or a 3-D surface. The text page surface may be invisible. Further, the method may further comprise: a) applying one or more of a static texture, an animated texture or combinations thereof to the text page surface, b) clipping a portion of a first 3-D text object that extends beyond a boundary defined by the text page surface and c) scaling the 3-D text object to fit within boundaries defined by the text page surface.

[0018] In other embodiments, the method may comprise orientating an angular position of each of the 3-D text objects in the 3-D gaming environment. The angular position of each the 3-D text objects may vary as a function of time. In particular, the angular positions of each the 3-D text objects may be oriented so that one surface of the 3-D text objects is aligned with a slope or a normal of a curved line or a curved surface in the 3-D gaming environment.

[0019] In particular embodiments, the method may further comprise rendering the textual information in the 3-D gaming environment for one or more of i) a game outcome presentation for the game of chance, ii) a gaming maintenance operation, iii) an attract mode feature, iv) a promotional feature, v) casino information, vi) bonus game presentation and capturing the textual information on the one or more two-dimensional images. Further, the textual information conveyed by the 3-D text objects may be information from one or more of a game of chance, a bonus game, an advertisement, news, stock quotes, electronic mail, a web page, a message service, a locator service or a hotel/casino service, a movie, a musical selection, a casino promotion, a broadcast event, a maintenance operation, a player tracking service, a drink menu and a snack menu.

[0020] In particular embodiments, a text string comprising a plurality of alphanumeric characters may be mapped to a plurality of 3-D text objects where each of the 3-D text objects conveys the textual information for one of the alphanumeric characters in the text string. The method may further comprise applying one or more typesetting rules for improving a quality of the textual information rendered from the plurality of 3-D text objects representing the text string. The typesetting rules may be for one or more of i) adjusting a spacing between the characters, ii) adjusting color weights of the characters, iii) justifying the text string, iv) centering the characters, v) adjusting dimensions of strokes defining the characters, vi) aligning the characters with a baseline, vii), positioning the text string to two or more lines, viii) adjusting the spacing between two or more lines of text, ix) adjusting the vertical or horizontal alignment of the characters, x) adjusting a relative size of each character, xi) adjusting pixels defining a text character and xii) and adjusting texels defining a text character. In other embodiments, the method may further comprise one or more of a) prior to rendering the one or more two dimensional images, generating one or more font textures wherein each font texture comprises a plurality of characters and loading the