## 4.2 Опис методів частин програмного забезпечення

### 4.2.1 Стандартні методи

У таблиці 1.1 наведено повний опис стандартних методів, що використані у проекті

– Стандартніметоди

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № п/п | Назва классу | Назва функції | Призначення функції | Опис вхідних параметрів | Опис вихідних параметрів | Заголовний файл |
| 1 | Vector2 | \_\_init\_ | Class Constructor | x - x coordinate  y - y coordinate | Vector2 object | pygame.math |
| 2 | Vector2 | length | get the length of the vector | - | length of the vector | pygame.math |
| 3 | Vector2 | copy | get the deep copy of the vector | - | copy of the vector | pygame.math |
| 4 | Rect | \_\_init\_\_ | Class Constractor | left - left edge coordinate  top - top edge coordinate  width - width of rectangle  height - height of rectagle | Rect object | pygame |
| 5 | Rect | collidepoint | test if a point is inside a rectangle | x - x coordinate  y - y coordinate | Returns true if the given point is inside the rectangle | pygame |
| 6 | Clock | \_\_init\_\_ | Class Constructor | - | Clock object | pygame.time |
| 7 | Clock | tick | update the clock | framerate - framerate at which the game should run | milliseconds from previous call | pygame.time |
| 8 | Surface | \_\_init\_\_ | Class Constructor | width - width of surface  height - height of surface | Surface object | pygame |
| 9 | Surface | blit | draw one image onto another | source - source surface to draw | - | pygame |
| 10 | Surface | fill | fills the surface with color | color - color to fill the surface with | - | pygame |
| 11 | Surface | get\_size | get dimetions of the surface | - | tuple with dimentions of the surface | pygame |
| 12 | Surface | get\_rect | get the rectangular area of the Surface | - | Rect object | pygame |
| 13 | Surface | convert\_alpha | change the pixel format of an image including per pixel alphas | - | Converted Surface | pygame |
| 14 | Font | \_\_init\_\_ | Class constructor | filename - name font file  size - size of font in points | Font object | pygame.font |

### 4.2.2 Користувацькі методи

У таблиці 1.2 наведено повний опис методів, що були створені під час розробки ПЗ

– Користувацькі методи

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № п/п | Назва классу | Назва функції | Призначення функції | Опис вхідних параметрів | Опис вихідних параметрів | Заголовний  файл |
| 1 | ArrowsGame | \_\_init\_\_ | Init game objects | - | - | arrows\_game |
| 2 | ArrowsGame | \_handle\_events | Handle pygame events queue | - | - | arrows\_game |
| 3 | ArrowsGame | \_handle\_gen\_  new\_board\_event | Generate new board if gen\_new\_board\_button is clicked, clear add and delete arrow buttons | mouse\_pos - Mouse position | - | arrows\_game |
| 4 | ArrowsGame | \_handle\_add\_  arrow\_event | Set arrow image and direction of select arrow grid square if add\_arrow\_button is clicked. Updates selection for  correct highlighting of numbers that the arrow points to. Creates delete arrow button. Creates and end session  button if every arrow grid square is filled and gets rid of error numbers highlighting. | mouse\_pos - Mouse position | - | arrows\_game |
| 5 | ArrowsGame | \_handle\_delete\_  arrow\_event | Sets selected image and direction to None. Updates selection for correct highlighting of numbers that the arrow  points to. Deletes delete arrow button and end session button, gets rid of error numbers highlighting. | mouse\_pos - Mouse position | - | arrows\_game |
| 6 | ArrowsGame | \_handle\_end\_  session\_event | Evaluates correctness of arrows and sets appropriate game state | mouse\_pos - Mouse position | - | arrows\_game |
| 7 | ArrowsGame | \_handle\_arrow\_  selection\_event | Highlights selected arrow and numbers that it points to. Adds button for adding arrows to selected square. | mouse\_pos - Mouse position | - | arrows\_game |
| 8 | ArrowsGame | \_handle\_number\_  selection\_event | Highlights selected number and arrows that point to it. Clears all arrow manipulation buttons | mouse\_pos - Mouse position | - | arrows\_game |
| 9 | ArrowsGame | \_handle\_start\_  message\_events | Sets game state to active and deletes message. | mouse\_pos - Mouse position | - | arrows\_game |
| 10 | ArrowsGame | \_handle\_end\_message  \_correct\_events | Handles end message button click when game is over and all numbers on grid match with number of arrows that  point to it. | mouse\_pos - Mouse position | - | arrows\_game |
| 11 | ArrowsGame | \_handle\_end\_message  \_wrong\_events | Handles end message button click when game is over and at least one number on grid don't with number of arrows that point to it. | mouse\_pos - Mouse position | - | arrows\_game |
| 12 | ArrowsGame | \_update\_screen | Render updated objects on screen and update screen | - | - | arrows\_game |
| 13 | ArrowsGame | run | Run main game loop | - | - | arrows\_game |
| 14 | CollideRect  Evaluetor | evaluate\_from\_ratios | Get collision rect for message buttons | ratios - Coordinates of collide rect box divided by image size  base\_rect - Rect of image that holds collide rect | Collision rect for message buttons | utils.collide\_rect  \_evaluator |
| 15 | Core | gen\_arrows | Generate arrows dict with keys as direction on game board and list of arrows as values | - | - | utils.core |
| 16 | Core | get\_possible\_directions | Get possible arrow directions for given arrow location | arrow\_set - Direction in which the arrow is located  arrow\_num - Sequence number of arrow on arrow set counting from up or left | List of possible directions that arrow can point to | utils.core |
| 17 | Core | get\_position | Get position relative to board of given arrow | arrows\_set\_direction - Direction in which the arrow is located  arrow\_num - Sequence number of arrow on arrow set counting from up or left | Position vector of arrow relative to game board | utils.core |
| 18 | Core | get\_span | Get all grid squares that given arrow points to | position - Position vector of arrow relative to game board  arrow - Direction in which arrow points to | List of grid square positions that given arrow points to | utils.core |
| 19 | Core | get\_pointings | Get all arrows that point to specified location on board | grid\_square - Position of grid square relative to board | List of arrow sets and arrow numbers that point to given grid square | utils.core |
| 20 | Core | count\_pointings | Count number of arrows that point to specified location on board | grid\_square - Position of grid square relative to board | Number of arrows that point to given grid square | utils.core |
| 21 | Core | evaluate\_correctness | Get all numbers that don't match with number of arrows that point to them | - | List of numbers, values of which don't match with number of arrows that point to them | utils.core |
| 22 | Core | gen\_numbers | Generate numbers matrix based on previously generated arrows | - | - | utils.core |
| 23 | GridPosition | \_\_init\_\_ | Class constructor | grid\_square\_pos - Column and row of grid square relative to board | - | control.  grid\_position |
| 24 | GridPosition | get\_coords | Get exact pixel position on upper right corner of the object | - | Vector of pixel coordinates of topleft corner of grid square | control.  grid\_position |
| 25 | GridPosition | get\_coords\_center | Get center of specified grid square in pixels | - | Vector of pixel coordinates of the center of grid square | control.  grid\_position |
| 26 | Screen | set\_caption | Set caption for game window | name - Name for window caption | - | control.screen |
| 27 | Settings | get\_resolution | Get actual pixel resolution of entire screen | - | Actual pixel resolution of entire screen | control.settings |
| 28 | Board | \_\_init\_\_ | Class constructor | - | - | assets.board |
| 29 | Board | update\_selection | Deselect and select object for correct arrow adding and deletion | - | - | assets.board |
| 30 | Board | deselect\_all | Deselect any selection | - | - | assets.board |
| 31 | Board | get\_selected\_arrow | Return selected arrow object if any were selected | - | arrow grid  square  object | assets.board |
| 32 | Board | dehighlight\_errors | Get rid of highlighting on numbers that don't match | - | - | assets.board |
| 33 | Board | highlight\_errors | Highlight numbers that don't match | - | - | assets.board |
| 34 | Board | check\_correctness | Load current arrows and numbers to core class and evaluate correctness | - | - | assets.board |
| 35 | Board | get\_arrow | Get arrow by pixel position | pos - position to get arrow by | arrow grid  square  object | assets.board |
| 36 | Board | set\_arrow\_image | Set arrow image for selected arrow square if any | image - New image to set  direction - direcion of arrow on image to set direction attribute  highlight\_color - color that object was highlighted to restore it | - | assets.board |
| 37 | Board | check\_arrow\_selection | Check if arrow was selected | mouse\_pos - Mouse position in pixel coordinates | True if arrow under current mouse position is selected | assets.board |
| 38 | Board | check\_number\_selection | Check if number was selected | mouse\_pos - Mouse position in pixel coordinates | True if number under current mouse position is selected | assets.board |
| 39 | Board | handle\_arrow\_selection | Select arrow and numbers it points to | mouse\_pos - Mouse position in pixel coordinates | - | assets.board |
| 40 | Board | handle\_number\_selection | Select number and arrows that point to it | mouse\_pos - Mouse position in pixel coordinates | - | assets.board |
| 41 | Board | draw | Draw object to given surface | - | - | assets.board |
| 42 | Arrow | \_\_init\_\_ | Class constructor | direction - Direction of arrow to render appropriate image | - | assets.arrow |
| 43 | Number | \_\_init\_\_ | Class constructor | value - Numeric value of number object | - | assets.number |
| 44 | Button | \_\_init\_\_ | Class constructor | image\_path - Filepath to button image  position - Grid square position relative to board  color - Color to fill the button image with  conform\_size - Scale image according to button icon size value in settings. If False - scaling\_nonconformal parameter is required  scaling\_nonconformal - Value to scale image with | - | assets.buttons.  button |
| 45 | Button | is\_clicked | Check if button is clicked | - | - | assets.buttons.  button |
| 46 | Button | draw | Draw object to given surface | - | - | assets.buttons.  button |
| 47 | Button | handle\_click | Abstract method for action that button makes | - | - | assets.buttons.  button |
| 48 | AddArrow  Button | \_\_init\_\_ | Class constructor | direction - Direction of arrow that it adds when button is clicked | - | assets.buttons.  add\_arrow\_  button |
| 49 | AddArrow  Button | handle\_click | Return new arrow image of given direction to set as image attribute of selected square | - | Needed attributes for changing the image of arrow grid square: new arrow image, its direction and color that it was highlighted with | assets.buttons.  add\_arrow\_  button |
| 50 | DeleteArrow  Button | \_\_init\_\_ | Class constructor | - | - | assets.buttons.  delete\_arrow\_  button |
| 51 | EndSession  Button | \_\_init\_\_ | Class constructor | - | - | assets.buttons.  end\_session  button |
| 52 | GenNew  BoardButton | \_\_init\_\_ | Class constructor | - | - | assets.buttons.  gen\_new\_board  \_button |
| 53 | GridSquare | \_\_init\_\_ | Class constructor | content - Image to fill the square with | - | assets.  grid\_squares.  grid\_square |
| 54 | GridSquare | draw | Draw object to given surface | - | - | assets.  grid\_squares.  grid\_square |
| 55 | GridSquare | select | Add given color to image | highlight\_color - Color to restore highlighting with | - | assets.  grid\_squares.  grid\_square |
| 56 | GridSquare | deselect | Subtract given color from image | highlight\_color - Color to restore highlighting with | - | assets.  grid\_squares.  grid\_square |
| 57 | ArrowGrid  Square | \_\_init\_\_ | Class constructor | arrow\_set - Direction in which the arrow is located  arrow\_num - Sequence number of arrow on arrow set counting from up or left | - | assets.  grid\_squares.  arrow\_grid  \_square |
| 58 | ArrowGrid  Square | set\_image | Set arrow image for arrow grid square | image - Arrow image to fill the arrow grid square  direction - Direction that arrow points to | - | assets.  grid\_squares.  arrow\_grid  \_square |
| 59 | NumberGrid  Square | \_\_init\_\_ | Class constructor | col - Column of number position relative to board  row - Row of number position relative to board  value - Numeric value of number object | - | assets.  grid\_squares.  number\_grid  \_square |
| 60 | NumberGrid  Square | highlight\_error | Add red highlight color to image | - | - | assets.  grid\_squares.  number\_grid  \_square |
| 61 | NumberGrid  Square | dehighlight\_error | Subtract red highlight color from image | - | - | assets.  grid\_squares.  number\_grid  \_square |
| 62 | Message | \_\_init\_\_ | Class constructor | image\_path - Path to message image path | - | assets.messages.  message |
| 63 | Message | draw | Draw object to given surface | - | - | assets.messages.  message |
| 64 | StartMessage | \_\_init\_\_ | Class constructor | - | - | assets.messages.  start\_message |
| 65 | Correct  Message | \_\_init\_\_ | Class constructor | - | - | assets.messages.  correct\_message |
| 66 | Wrong  Message | \_\_init\_\_ | Class constructor | - | - | assets.messages.  wrong\_message |