API Documentation

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Contents

Co	onter	${ m tts}$	1
1	Mod 1.1 1.2	dule codecs Functions Variables	2 2 3
2	Mod	dule credit	5
	2.1	Functions	5
	2.2	Variables	5
3	Mod	dule math	6
	3.1	Functions	6
	3.2	Variables	9
4			10
	4.1		10
	4.2		27
	4.3		28 28
			29
	4.4	1	29 29
	4.4		30
			31
		1	32
	4.5		32
	4.0	4.5.1 Methods	32
		4.5.2 Properties	34
		<u>.</u>	35
5		1	36
	5.1		36
	5.2	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	36
	5.3		38
			38
	- 1	5.3.2 Properties	39
	5.4	Class Pickler	39
			39
		5.4.2 Class Variables	41

	5.5	Class PicklingError
		5.5.1 Methods
		5.5.2 Properties
	5.6	Class Unpickler
		5.6.1 Methods
		5.6.2 Class Variables
	5.7	Class UnpicklingError
		5.7.1 Methods
		5.7.2 Properties
		•
6	Mod	dule posixpath 47
	6.1	Functions
	6.2	Variables
7		kage pygame 51
	7.1	Functions
	7.2	Variables
	7.3	Class BufferError
		7.3.1 Methods
		7.3.2 Properties
	7.4	Class BufferProxy
		7.4.1 Methods
		7.4.2 Properties
	7.5	Class Color
		7.5.1 Methods
		7.5.2 Properties
	7.6	Class Overlay
		7.6.1 Methods
		7.6.2 Properties
	7.7	Class PixelArray
		7.7.1 Methods
		7.7.2 Properties
	7.8	Class Rect
		7.8.1 Methods
		7.8.2 Properties
	7.9	Class Surface
		7.9.1 Methods
		7.9.2 Properties
	7.10	Class Surface
		7.10.1 Methods
		7.10.2 Properties
	7 11	Class error
	1.11	7.11.1 Methods
		7.11.2 Properties
		7.11.2 1 Topolitics
8	Pac	kage pygame-asteroids
	8.1	Modules
	8.2	Variables
9	Mod	dule pygame-asteroids.asteroid' 92
	9.1	Variables
	9.2	Class Asteroid

		9.2.1	Methods					 	 	 		 	 	 				. 92
			Propertie															
			Class Var															
	9.3		olor															
			Methods															
			Class Var															
	9.4	-	priteColli															
		9.4.1	Methods					 	 	 	•	 		 		 •	 •	. 95
10	Mod	dule pyg	game-as	teroid:	s.bul	llet'	,											97
			es					 	 	 		 	 	 				. 97
	10.2	Class B	ullet					 	 	 		 	 	 				. 97
		10.2.1	Methods					 	 	 		 	 	 				. 97
		10.2.2	Propertie	s				 	 	 		 	 	 				. 98
	10.3	Class S ₁	priteColli	sion .				 	 	 		 	 	 				. 98
		10.3.1	Methods					 	 	 		 	 	 				. 98
11	Mod	dule nyo	game-as	teroid	s col	or												100
			es															
			olor \dots															
	11.2		Methods															
			Class Var															
															-			
12			game-as															102
			ns															
	12.2	Variable	es					 	 	 		 		 				. 102
					- - 61 -	,												103
13	Mod	dule pv	game-as	teroid	$\mathbf{s.me}$													TOO
13			game-as					 	 	 		 	 	 				
13	13.1	Variable																. 103
13	13.1	Variable Class D	es	 ler		· ·		 	 	 		 	 	 				. 103
13	13.1 13.2	Variable Class D 13.2.1	es ataHand	 ler				 	 	 		 	 	 				. 103 . 103 . 103
13	13.1 13.2	Variable Class D 13.2.1 D Class F	es ataHand Methods	 ler 		· · · · · ·		 	 	 		 	 	 		 	 	. 103 . 103 . 103
13	13.1 13.2	Variable Class D 13.2.1 D Class Fi 13.3.1 D	es ataHand Methods ileManag	ler er				 	 	 		 	 	 		 	 	. 103. 103. 103. 103. 103
	13.1 13.2 13.3	Variable Class D 13.2.1 Class F: 13.3.1 D 13.3.2 O	es ataHand Methods ileManag Methods Class Var	ler				 	 	 		 	 	 		 	 	103103103103104
	13.1 13.2 13.3 Mod	Variable Class D 13.2.1 Class F: 13.3.1 Class F: 13.4.2 dule pyg	es ataHand Methods ileManag Methods Class Var	ler				 	 	 	•	 	 	 		 	 	 103 103 103 103 104
	13.1 13.2 13.3 Moc 14.1	Variable Class D 13.2.1 I Class F: 13.3.1 I 13.3.2 C dule pyg	es ataHand Methods ileManag Methods Class Var game-as	ler er				 		 		 		 		 	 	. 103 . 103 . 103 . 103 . 104 . 104
	13.1 13.2 13.3 Moc 14.1	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 O dule pyg Variable Class Fe	es ataHand Methods ileManag Methods Class Var game-as: es	ler er						 				 		 	 	. 103 . 103 . 103 . 103 . 104 . 104 . 105 . 105
14	13.1 13.2 13.3 Mod 14.1 14.2	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 C dule pyg Variable Class Fe 14.2.1 C	es ataHand Methods ileManag Methods Class Var game-as es cnt Class Var	ler	s.fon					 				 		 	 	. 103 . 103 . 103 . 103 . 104 . 105 . 105 . 105
14	13.1 13.2 13.3 Mod 14.1 14.2	Variable Class D 13.2.1 I Class Fi 13.3.1 I 13.3.2 O dule pyg Variable Class Fo 14.2.1 O dule pyg	es ataHand Methods ileManag Methods Class Var game-as: es chass Var	ler	s.fon			 		 	• • •			 		 	 	. 103 . 103 . 103 . 103 . 104 . 105 . 105 . 105
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 O dule pyg Variable Class F: 14.2.1 O dule pyg Function	es ataHand: Methods ileManag Methods Class Var game-as: es Class Var	ler	s.fon			 		 						 	 	. 103 . 103 . 103 . 103 . 104 105 . 105 . 105
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2	Variable Class D 13.2.1 I Class F: 13.3.1 I 13.3.2 C dule pyg Variable Class F: 14.2.1 C dule pyg Functio Variable	es ataHand. Methods ileManag Methods Class Var game-as: es	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 106 . 106
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 O dule pyg Variable Class Fo 14.2.1 O dule pyg Function Variable Class A	es ataHand Methods ileManag Methods Class Var game-as es	ler	s.fon													. 103 . 103 . 103 . 104 . 105 . 105 . 105 . 106 . 106 . 106
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 O dule pyg Variable Class Fo 14.2.1 O dule pyg Function Variable Class A 15.3.1 D	es ataHand Methods ileManag Methods Class Var game-as es	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 106 . 106 . 106 . 107 . 107
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 O dule pyg Variable Class F: 14.2.1 O dule pyg Function Variable Class A 15.3.1 D 15.3.2 D	es ataHandi Methods ileManag Methods Class Var game-as: es Class Var game-as: ms es steroid Methods Propertie	ler	s.fon													. 103 . 103 . 103 . 104 . 105 . 105 . 105 . 106 . 106 . 106 . 107 . 107
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2 15.3	Variable Class D 13.2.1 D Class F 13.3.1 D 13.3.2 O dule pyg Variable Class F 14.2.1 O dule pyg Function Variable Class A 15.3.1 D 15.3.2 D 15.3.3 O	es ataHand: Methods ileManag Methods Class Var game-as: es	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 106 . 106 . 107 . 107 . 108 . 108
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2 15.3	Variable Class D 13.2.1 D Class F 13.3.1 D 13.3.2 O dule pyg Variable Class F 14.2.1 O dule pyg Function Variable Class A 15.3.1 D 15.3.2 D 15.3.3 O Class B	es ataHandi Methods ileManag Methods Class Var game-as: es Class Var game-as: hsteroid Methods Propertie Class Var	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 106 . 106 . 107 . 107 . 108 . 108
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2 15.3	Variable Class D 13.2.1 D Class F: 13.3.1 D 13.3.2 C dule pyg Variable Class F: 14.2.1 C dule pyg Function Variable Class A 15.3.1 D 15.3.2 D 15.3.3 C Class B 15.4.1 D	es ataHand: Methods ileManag Methods Class Var game-as: es	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 105 . 106 . 106 . 107 . 107 . 108 . 108 . 108 . 108
14	13.1 13.2 13.3 Mod 14.1 14.2 Mod 15.1 15.2 15.3	Variable Class D 13.2.1 1 13.3.2 0 13.3.2 0 13.3.2 0 13.3.2 0 13.3.2 0 14.2.1 0 14.2.1 0 15.3.3 0 15.3.3 0 15.3.3 0 15.4.1 15.4.2 1	es ataHandi Methods ileManag Methods Class Var game-as: es Class Var game-as: hsteroid Methods Propertie Class Var	ler	s.fon													. 103 . 103 . 103 . 104 . 104 . 105 . 105 . 106 . 106 . 106 . 107 . 108 . 108 . 108 . 108

	15.5.2 Class Variables	11
15	6 Class DataHandler	
10	15.6.1 Methods	
15	7 Class FileManager	
10	15.7.1 Methods	
	15.7.1 Methods	
1 -		
15	3 Class Font	
	15.8.1 Class Variables	
15	9 Class Game	
	15.9.1 Methods	
15	10Class GameController	.13
	15.10.1 Methods	13
	15.10.2 Properties	15
	15.10.3 Class Variables	15
15	11Class Ship	
	15.11.1 Methods	
	15.11.2 Properties	
	15.11.3 Class Variables	
15	12Class SpriteCollision	
10	15.12.1 Methods	
1 5		
15	13Class SpriteGroup	
	15.13.1 Methods	
	15.13.2 Properties	
15	14Class StarField	
	15.14.1 Methods	
	15.14.2 Properties	
	15.14.3 Class Variables	20
15	15Class TextInput	21
	15.15.1 Methods	21
	15.15.2 Properties	
15	16Class TouchButtons	
	15.16.1 Methods	
15	17Class VirtualKey	
10	15.17.1 Methods	
1 5	15.17.2 Properties	
15	18Class VirtualKeyboard	
	15.18.1 Methods	
	15.18.2 Properties	
15	19Class error	
	15.19.1 Methods	.25
	15.19.2 Properties	.25
15	20Class struct_rusage	25
	15.20.1 Methods	26
	15.20.2 Properties	27
	15.20.3 Class Variables	
	FJ 8	2 9
16	1 Functions	29
	1,00	30
17	Class MenuItem	
	17.1.1 Methods	.30

	17.2	ass Menu	
		.2.1 Methods	
	17.3	ass MainMenu	
		.3.1 Methods	2
18	Mod	e pygame-asteroids.polygon' 13-	1
10		riables	_
		ass Color	
		.2.1 Methods	
		.2.2 Class Variables	
	18.3	ass Cube	
		.3.1 Methods	5
	18.4	ass Point3D	6
		.4.1 Methods	6
	18.5	ass itemgetter	6
		.5.1 Methods	6
		.5.2 Properties	7
10	3.6		_
19		e pygame-asteroids.resource_manager' 136 ariables	_
		ass Font	
	19.2	ass ront	
	10.3	ass ResourceManager	
	19.5	ass resourcemanager	
		3.2 Class Variables	
		.9.2 (1635 Valiables	1
2 0		e pygame-asteroids.score 143	_
		riables	
	20.2	ass DataHandler	
		.2.1 Methods	2
91	Mod	e pygame-asteroids.ship 14	2
41		riables	_
		ass Ship	
	21.2	.2.1 Methods	
		.2.2 Properties	
		.2.3 Class Variables	
22		e pygame-asteroids.sprite_collision 14	
		ariables	
	22.2	ass SpriteCollision	
		.2.1 Methods	b
23	Mod	e pygame-asteroids.start_field 14	8
-0		ariables	
		ass StarField	
		.2.1 Methods	
		.2.2 Properties	
		.2.3 Class Variables	
24		e pygame-asteroids.state_machine'	
		riables	
	24.2	ass StateMachine	0

		24.2.1 Methods
		24.2.2 Properties
25		ule pygame-asteroids.states.franchise' 152
		Functions
		Variables
	25.3	Class Color
		$25.3.1 \text{ Methods} \dots \dots$
		25.3.2 Class Variables
	25.4	Class Cube
		25.4.1 Methods
	25.5	Class Font
		25.5.1 Class Variables
	25.6	Class Franchise
		$25.6.1 \; \text{Methods} \dots \dots$
		25.6.2 Properties
	25.7	Class Point3D
		25.7.1 Methods
	25.8	Class error
	20.0	25.8.1 Methods
		25.8.2 Properties
	25.0	Class itemgetter
	20.9	25.9.1 Methods
	05 1/	25.9.2 Properties
	25.10	Class struct_rusage
		25.10.1 Methods
		25.10.2 Properties
		25.10.3 Class Variables
26	Mod	ule pygame-asteroids.states.intro' 161
	26.1	Functions
	26.2	Variables
	26.3	Class Color
		26.3.1 Methods
		26.3.2 Class Variables
	26.4	Class Font
		26.4.1 Class Variables
	26.5	Class Introduction
	20.0	26.5.1 Methods
		26.5.2 Properties
		20.5.2 Troperdes
~-		
27		ule pygame-asteroids.states.menu 165
27		ule pygame-asteroids.states.menu 165 Class Menu
27		
27		Class Menu
	27.1	Class Menu
	27.1 Mod	Class Menu 165 27.1.1 Methods 165 27.1.2 Properties 166 ule pygame-asteroids.states.seal' 167
	27.1 Mod 28.1	Class Menu 168 27.1.1 Methods 168 27.1.2 Properties 166 ule pygame-asteroids.states.seal' 167 Functions 167
	27.1 Mod 28.1 28.2	Class Menu 165 27.1.1 Methods 165 27.1.2 Properties 166 ule pygame-asteroids.states.seal' 167 Functions 167 Variables 167
	27.1 Mod 28.1 28.2	Class Menu 165 27.1.1 Methods 165 27.1.2 Properties 166 ule pygame-asteroids.states.seal' 167 Functions 167 Variables 167 Class Color 168
	27.1 Mod 28.1 28.2	Class Menu 165 27.1.1 Methods 165 27.1.2 Properties 166 ule pygame-asteroids.states.seal' 167 Functions 167 Variables 167

	28.4	Class Font	39
		8.4.1 Class Variables	
	28.5	Class Seal	
		8.5.1 Methods	
		8.5.2 Properties	
	28.6	Class error	
		8.6.1 Methods	
		8.6.2 Properties	
	28.7	Class struct_rusage	
		8.7.1 Methods	
		8.7.2 Properties	
		8.7.3 Class Variables	4
29	Pacl	age pygame-asteroids.states'	' 5
		Modules	_
		Variables	
	20.2	didoico	0
30		ıle pygame-asteroids.test_audio' 17	_
	30.1	Functions	76
	30.2	Variables	76
	30.3	Class Asteroid	
		0.3.1 Methods	77
		0.3.2 Properties	
		0.3.3 Class Variables	
	30.4	Class Bullet	
		0.4.1 Methods	
		0.4.2 Properties	
	30.5	Class Color	
		0.5.1 Methods	
		0.5.2 Class Variables	
	30.6	Class DataHandler	
		0.6.1 Methods	
	30.7	Class FileManager	
		0.7.1 Methods	
	20.0	0.7.2 Class Variables	
	30.8	Class Font	
	20.0	0.8.1 Class Variables 18 Class Game 18	
	50.9		
	20.10	0.9.1 Methods 18 Class GameController 18	
	30.10	0.10.1 Methods	
		0.10.1 Methods	
		0.10.3 Class Variables	
	30 1°	Class ResourceManager	
	30.1.	0.11.1 Methods	
		0.11.2 Class Variables	
	30.19	Class Ship	
	50.12	0.12.1 Methods	
		0.12.2 Properties	
		0.12.3 Class Variables	
	30.15	Class SpriteCollision	
	JU.16	0.13.1 Methods	
			-

30.1	4Class SpriteGroup .													192
30.1	30.14.1 Methods													
	30.14.2 Properties													
20.1	5Class StarField													
30.1	30.15.1 Methods													
	30.15.2 Properties													
	30.15.3 Class Variable													
30.1	6Class TextInput													
	$30.16.1\mathrm{Methods}$													
	30.16.2 Properties													
30.1	7Class TouchButtons		 	 	 	 		 						. 195
	$30.17.1\mathrm{Methods}$. 195
30.1	8Class VirtualKey		 	 	 	 		 						. 195
	30.18.1 Methods													
	30.18.2 Properties													
30.1	9Class VirtualKeyboar													
00.1	30.19.1 Methods													
	30.19.2 Properties													
20.9	OClass error													
30.2														
	30.20.1 Methods													
	30.20.2 Properties													
30.2	21Class struct_rusage .													
	$30.21.1\mathrm{Methods}$													
	30.21.2 Properties													
	30.21.3 Class Variable	s	 	 	 	 		 						. 201
	dule pygame-asteroi													202
31.1	Functions		 	 										. 202
31.1 31.2	Functions		 	 	 	 		 						. 202 . 202
31.1 31.2	Functions		 	 	 	 		 						. 202 . 202
31.1 31.2	Functions		 	 	 	 		 						. 202 . 202 . 203
31.1 31.2	Functions		 	 	 	 		 		 	 	 	 	 . 202 . 202 . 203 . 203
31.1 31.2	Functions				 	 		 	 	 	 	 		 . 202 . 202 . 203 . 203 . 204
31.1 31.2 31.3	Functions				 	 					 	 		 . 202 . 202 . 203 . 203 . 204 . 204
31.1 31.2 31.3	Functions				 	 				· · · · · · · · · · · · · · · · · · ·	 	 	· · · · · · · ·	 . 202 . 202 . 203 . 203 . 204 . 204
31.1 31.2 31.3	Functions				 	 					 	 		 . 202 . 203 . 203 . 204 . 204 . 204 . 205
31.1 31.2 31.3 31.4	Functions				 	 					 	 		 . 202 . 203 . 203 . 204 . 204 . 204 . 205 . 205
31.1 31.2 31.3 31.4	Functions				 	 					 	 		 . 202 . 203 . 203 . 204 . 204 . 204 . 205 . 205
31.1 31.2 31.3 31.4	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods	ss			 		· · · · · · · · · · · · · · · · · · ·					 		 . 202 . 202 . 203 . 203 . 204 . 204 . 204 . 205 . 205 . 206
31.1 31.2 31.3 31.4 31.5	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable				 							 		. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207
31.1 31.2 31.3 31.4 31.5	Functions				 									. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207
31.1 31.2 31.3 31.4 31.5	Functions													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207
31.1 31.2 31.3 31.4 31.5	Functions													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207 . 207
31.1 31.2 31.3 31.4 31.5	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207 . 207 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable 31.7.2 Class Variable													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207 . 207 . 208 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 206 . 207 . 207 . 207 . 208 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable 31.7.2 Class Variable													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6 31.7	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable Class Font													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6 31.7	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods Class FileManager 31.7.2 Class Variable Class Font 31.8.1 Class Variable													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208 . 208
31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods Class FileManager 31.7.2 Class Variable Class Font 31.8.1 Class Variable Class Game													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208 . 208 . 208 . 209 . 209
31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable Class Font 31.8.1 Class Variable Class Game 31.9.1 Methods Class Game 31.9.1 Methods Class Game Class GameControlle													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208 . 208 . 208 . 209 . 209 . 209
31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable Class Font 31.8.1 Class Variable Class Game 31.9.1 Methods Class Game 31.9.1 Methods Class GameControlle 31.10.1 Methods													. 202 . 202 . 203 . 203 . 204 . 204 . 205 . 205 . 206 . 207 . 207 . 207 . 208 . 208 . 208 . 208 . 208 . 208 . 209 . 209 . 209 . 209
31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8	Functions Variables Class Asteroid 31.3.1 Methods 31.3.2 Properties 31.3.3 Class Variable Class Bullet 31.4.1 Methods 31.4.2 Properties Class Color 31.5.1 Methods 31.5.2 Class Variable Class DataHandler 31.6.1 Methods Class FileManager 31.7.1 Methods 31.7.2 Class Variable Class Font 31.8.1 Class Variable Class Game 31.9.1 Methods Class Game 31.9.1 Methods Class Game Class GameControlle													202 202 203 203 204 204 205 205 206 206 207 207 207 208 208 208 208 208 208 208 209 209 209

31.11Class ResourceManager	2	211
31.11.1 Methods		
31.11.2 Class Variables		
31.12Class Ship		
31.12.1 Methods		
31.12.2 Properties		
31.12.3 Class Variables		
31.13Class SpriteCollision		
31.13.1 Methods		
31.14Class SpriteGroup		
31.14.1 Methods		
31.14.2 Properties		
31.15Class StarField		
31.15.1 Methods		
31.15.2 Properties		
31.15.3 Class Variables		
31.16Class TextInput		
31.16.1 Methods		
31.16.2 Properties		
31.17 Class TouchButtons		
31.17.1 Methods		
31.18 Class VirtualKey		
31.18.1 Methods		
31.18.2 Properties		
31.19Class VirtualKeyboard		
31.19.1 Methods		
31.19.2 Properties		
31.20Class error		
31.20.1 Methods		
31.20.2 Properties		
31.21Class struct_rusage		
31.21.1 Methods		
31.21.2 Properties		
31.21.3 Class Variables	2	227
00 M. 1.1		
32 Module pygame-asteroids.test_startfield'		228
32.1 Functions		228 228
32.2 Variables		
32.3 Class StarField		
32.3.1 Methods		
32.3.2 Properties		
32.3.3 Class Variables	2	229
33 Module pygame-asteroids.test_touch_buttons'	2	230
33.1 Functions	_	230
33.2 Variables		230
33.3 Class Asteroid		
33.3.1 Methods		231
33.3.2 Properties		232
33.3.3 Class Variables		
33.4 Class Bullet		
33.4.1 Methods		

	33.4.2 Properties	വാവ
	33.5 Class Color	
	33.5.1 Methods	
	33.5.2 Class Variables	
	33.6 Class DataHandler	
	33.6.1 Methods	
	33.7 Class FileManager	 236
	33.7.1 Methods	 236
	33.7.2 Class Variables	 236
	33.8 Class Font	 236
	33.8.1 Class Variables	
	33.9 Class Game	
	33.9.1 Methods	
	33.10Class ResourceManager	
	33.10.1 Methods	
	33.10.2 Class Variables	
	33.11Class Ship	
	33.11.1 Methods	
	33.11.2 Properties	
	33.11.3 Class Variables	
	33.12Class SpriteCollision	
	33.12.1 Methods	
	33.13Class StarField	
	33.13.1 Methods	 244
	33.13.2 Properties	 244
	33.13.3 Class Variables	 244
	33.14Class TextInput	 245
	33.14.1 Methods	
	33.14.2 Properties	
	33.15Class TouchButtons	
	33.15.1 Methods	
	33.16Class VirtualKey	
	33.16.1 Methods	
	33.16.2 Properties	
	33.17Class VirtualKeyboard	
	33.17.1 Methods	
	33.17.2 Properties	
	33.18Class error	
	33.18.1 Methods	
	33.18.2 Properties	
	33.19Class struct_rusage	
	33.19.1 Methods	
	33.19.2 Properties	 251
	33.19.3 Class Variables	 252
٠.		
34	1 Module pygame-asteroids.test_virtual_keyboard'	253
	34.1 Functions	
	34.2 Variables	 253
9 =	Madula pygama astanoida toola?	254
3 3	5 Module pygame-asteroids.tools' 35.1 Functions	
	35.2 Variables	 . ∠ეე

	35.3	Class Anim
		$35.3.1 \ \text{Methods} \dots \dots$
		35.3.2 Properties
	35.4	Class Control
		$35.4.1 \ \text{Methods} \dots \dots$
		35.4.2 Properties
	35.5	Class StateMachine
		35.5.1 Methods
		35.5.2 Properties
	35.6	Class Timer
		35.6.1 Methods
		35.6.2 Properties
	3.6	
36		ule pygame-asteroids.touch_buttons 260
		Variables
	36.2	Class TouchButtons
		36.2.1 Methods
37	Mod	ule pygame-asteroids.virtual_controller 261
91		Functions
		Variables
	01.2	variables
38	Mod	ule pygame-asteroids.virtual_keyboard 262
	38.1	Variables
	38.2	Class TextInput
		38.2.1 Methods
		38.2.2 Properties
	38.3	Class VirtualKey
		38.3.1 Methods
		38.3.2 Properties
	38.4	Class VirtualKeyboard
		38.4.1 Methods
		38.4.2 Properties
39		ule random 266
		Functions
	39.2	Class Random
		39.2.1 Methods
		39.2.2 Properties
	20.2	39.2.3 Class Variables
	39.3	Class SystemRandom
		39.3.1 Methods
		39.3.2 Properties
	20.4	39.3.3 Class Variables
	39.4	Class WichmannHill
		39.4.1 Methods
		39.4.2 Properties
		93.4.0 Class variables
40	Mod	ule state_machine 281
		Variables
		Class StateMachine

		40.2.1 $40.2.2$	Methods Propertie	s	 							 							281 282
41	Mo	dule sy	\mathbf{s}															2	283
	41.1	Function	ons		 														284
	41.2	Variab	les		 														288
42	Mo	dule tir	me															-	291
	42.1	Function	me ons		 														292
			les																
	42.3		${ m truct_tim}\epsilon$																
			Methods																
		42.3.2	Propertie	s	 														296
		42.3.3	Class Var	iables	 														296

1 Module codecs

codecs – Python Codec Registry, API and helpers.

Written by Marc-Andre Lemburg (mal@lemburg.com).

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1.1 Functions

EncodedFile(file, data_encoding, file_encoding=None, errors='strict')

Return a wrapped version of file which provides transparent encoding translation.

Strings written to the wrapped file are interpreted according to the given data_encoding and then written to the original file as string using file_encoding. The intermediate encoding will usually be Unicode but depends on the specified codecs.

Strings are read from the file using file_encoding and then passed back to the caller as string using data_encoding.

If file_encoding is not given, it defaults to data_encoding.

errors may be given to define the error handling. It defaults to 'strict' which causes ValueErrors to be raised in case an encoding error occurs.

The returned wrapped file object provides two extra attributes .data_encoding and .file_encoding which reflect the given parameters of the same name. The attributes can be used for introspection by Python programs.

ignore_errors(...)

Implements the 'ignore' error handling, which ignores malformed data and continues.

lookup(encoding)

Looks up a codec tuple in the Python codec registry and returns a CodecInfo object.

Return Value

CodecInfo

lookup_error(errors)

Return the error handler for the specified error handling name or raise a LookupError, if no handler exists under this name.

Return Value

handler

Variables Module codecs

open(filename, mode='rb', encoding=None, errors='strict', buffering=1)

Open an encoded file using the given mode and return a wrapped version providing transparent encoding/decoding.

Note: The wrapped version will only accept the object format defined by the codecs, i.e. Unicode objects for most builtin codecs. Output is also codec dependent and will usually be Unicode as well.

Files are always opened in binary mode, even if no binary mode was specified. This is done to avoid data loss due to encodings using 8-bit values. The default file mode is 'rb' meaning to open the file in binary read mode.

encoding specifies the encoding which is to be used for the file.

errors may be given to define the error handling. It defaults to 'strict' which causes ValueErrors to be raised in case an encoding error occurs.

buffering has the same meaning as for the builtin open() API. It defaults to line buffered.

The returned wrapped file object provides an extra attribute .encoding which allows querying the used encoding. This attribute is only available if an encoding was specified as parameter.

register(search_function)

Register a codec search function. Search functions are expected to take one argument, the encoding name in all lower case letters, and return a tuple of functions (encoder, decoder, stream_wariter) (or a CodecInfo object).

register_error(errors, handler)

Register the specified error handler under the name errors. handler must be a callable object, that will be called with an exception instance containing information about the location of the encoding/decoding error and must return a (replacement, new position) tuple.

replace_errors(...)

Implements the 'replace' error handling, which replaces malformed data with a replacement marker.

strict_errors(...)

Implements the 'strict' error handling, which raises a UnicodeError on coding errors.

$xmlcharrefreplace_errors(...)$

Implements the 'xmlcharrefreplace' error handling, which replaces an unencodable character with the appropriate XML character reference.

1.2 Variables

Variables Module codecs

Name	Description
BOM	Value: '\xff\xfe'
BOM32_BE	Value: '\xfe\xff'
BOM32_LE	Value: '\xff\xfe'
BOM64_BE	Value: '\x00\x00\xfe\xff'
BOM64_LE	Value: '\xff\xfe\x00\x00'
BOM_BE	Value: '\xfe\xff'
BOMLE	Value: '\xff\xfe'
BOM_UTF16	Value: '\xff\xfe'
BOM_UTF16_BE	Value: '\xfe\xff'
BOM_UTF16_LE	Value: '\xff\xfe'
BOM_UTF32	Value: '\xff\xfe\x00\x00'
BOM_UTF32_BE	Value: '\x00\x00\xfe\xff'
BOM_UTF32_LE	Value: '\xff\xfe\x00\x00'
BOM_UTF8	Value: '\xef\xbb\xbf'

Variables Module credit

2 Module credit

2.1 Functions

credit(text, font, color, fps=40, callback=None)

Créditos rolando verticalmente

Parameters

text: Texto
font: Fonte
color: Cor

 $\textbf{credit_from_file}(\textit{file_name}, \textit{font}, \textit{color}, \textit{fps} \texttt{=} \texttt{40}, \textit{callback} \texttt{=} \texttt{None})$

2.2 Variables

Name	Description
package	Value: None

3 Module math

This module is always available. It provides access to the mathematical functions defined by the C standard.

3.1 Functions

acos(x)

Return the arc cosine (measured in radians) of x.

acosh(x)

Return the hyperbolic arc cosine (measured in radians) of x.

asin(x)

Return the arc sine (measured in radians) of x.

asinh(x)

Return the hyperbolic arc sine (measured in radians) of x.

atan(x)

Return the arc tangent (measured in radians) of x.

atan2(y, x)

Return the arc tangent (measured in radians) of y/x. Unlike atan(y/x), the signs of both x and y are considered.

atanh(x)

Return the hyperbolic arc tangent (measured in radians) of x.

$\mathbf{ceil}(x)$

Return the ceiling of x as a float. This is the smallest integral value >= x.

$\mathbf{copysign}(x, y)$

Return x with the sign of y.

$\cos(x)$

Return the cosine of x (measured in radians).

$\cosh(x)$

Return the hyperbolic cosine of x.

Functions Module math

degrees(x)

Convert angle x from radians to degrees.

$\mathbf{erf}(x)$

Error function at x.

$\mathbf{erfc}(x)$

Complementary error function at x.

exp(x)

Return e raised to the power of x.

expm1(x)

Return $\exp(x)$ -1. This function avoids the loss of precision involved in the direct evaluation of $\exp(x)$ -1 for small x.

fabs(x)

Return the absolute value of the float x.

factorial(x)

Find x!. Raise a ValueError if x is negative or non-integral.

Return Value

Integral

$\mathbf{floor}(x)$

Return the floor of x as a float. This is the largest integral value $\leq = x$.

$\mathbf{fmod}(x, y)$

Return fmod(x, y), according to platform C. x % y may differ.

frexp(x)

Return the mantissa and exponent of x, as pair (m, e). m is a float and e is an int, such that x = m * 2.**e. If x is 0, m and e are both 0. Else $0.5 \le abs(m) < 1.0$.

fsum(iterable)

Return an accurate floating point sum of values in the iterable. Assumes IEEE-754 floating point arithmetic.

$\mathbf{gamma}(x)$

Gamma function at x.

Functions Module math

$\mathbf{hypot}(x, y)$

Return the Euclidean distance, $sqrt(x^*x + y^*y)$.

isinf(x)

Check if float x is infinite (positive or negative).

Return Value

bool

isnan(x)

Check if float x is not a number (NaN).

Return Value

bool

$\mathbf{ldexp}(x, i)$

Return x * (2**i).

lgamma(x)

Natural logarithm of absolute value of Gamma function at x.

$\log(x, base = \dots)$

Return the logarithm of x to the given base. If the base not specified, returns the natural logarithm (base e) of x.

log10(x)

Return the base 10 logarithm of x.

log1p(x)

Return the natural logarithm of 1+x (base e). The result is computed in a way which is accurate for x near zero.

$\mathbf{modf}(x)$

Return the fractional and integer parts of x. Both results carry the sign of x and are floats.

$\mathbf{pow}(x, y)$

Return $x^{**}y$ (x to the power of y).

radians(x)

Convert angle x from degrees to radians.

sin(x)

Return the sine of x (measured in radians).

Variables Module math

sinh(x)

Return the hyperbolic sine of x.

 $\mathbf{sqrt}(x)$

Return the square root of x.

tan(x)

Return the tangent of x (measured in radians).

tanh(x)

Return the hyperbolic tangent of x.

 $\mathbf{trunc}(...)$

 ${\rm trunc}({\rm x:Real}) \mathrel{{\color{red} -}{>}} {\rm Integral}$

Truncates x to the nearest Integral toward 0. Uses the __trunc__ magic method.

3.2 Variables

Name	Description
package	Value: None
е	Value: 2.71828182846
pi	Value: 3.14159265359

4 Module os

OS routines for NT or Posix depending on what system we're on.

This exports:

- all functions from posix, nt, os2, or ce, e.g. unlink, stat, etc.
- os.path is one of the modules posixpath, or ntpath
- os.name is 'posix', 'nt', 'os2', 'ce' or 'riscos'
- os.curdir is a string representing the current directory ('.' or ':')
- os.pardir is a string representing the parent directory ('..' or '::')
- os.sep is the (or a most common) pathname separator ('/' or ':' or '\\')
- os.extsep is the extension separator ('.' or '/')
- os.altsep is the alternate pathname separator (None or '/')
- os.pathsep is the component separator used in \$PATH etc
- os.linesep is the line separator in text files (' $\$ '\r' or ' $\$ '\n')
- os.defpath is the default search path for executables
- os.devnull is the file path of the null device ('/dev/null', etc.)

Programs that import and use 'os' stand a better chance of being portable between different platforms. Of course, they must then only use functions that are defined by all platforms (e.g., unlink and opendir), and leave all pathname manipulation to os.path (e.g., split and join).

4.1 Functions

WCOREDUMP(status)

Return True if the process returning 'status' was dumped to a core file.

Return Value

bool

WEXITSTATUS(status)

Return the process return code from 'status'.

Return Value

integer

WIFCONTINUED(status)

Return True if the process returning 'status' was continued from a job control stop.

Return Value

bool

WIFEXITED(status)

Return true if the process returning 'status' exited using the exit() system call.

Return Value

bool

WIFSIGNALED(status)

Return True if the process returning 'status' was terminated by a signal.

Return Value

bool

WIFSTOPPED(status)

Return True if the process returning 'status' was stopped.

Return Value

bool

WSTOPSIG(status)

Return the signal that stopped the process that provided the 'status' value.

Return Value

integer

WTERMSIG(status)

Return the signal that terminated the process that provided the 'status' value.

Return Value

integer

abort()

Abort the interpreter immediately. This 'dumps core' or otherwise fails in the hardest way possible on the hosting operating system.

Return Value

does not return!

access(path, mode)

Use the real uid/gid to test for access to a path. Note that most operations will use the effective uid/gid, therefore this routine can be used in a suid/sgid environment to test if the invoking user has the specified access to the path. The mode argument can be F_OK to test existence, or the inclusive-OR of R_OK, W_OK, and X_OK.

Return Value

True if granted, False otherwise

$\mathbf{chdir}(path)$

Change the current working directory to the specified path.

$\mathbf{chflags}(path, flags)$

Set file flags.

$\mathbf{chmod}(\mathit{path}, \mathit{mode})$

Change the access permissions of a file.

chown(path, uid, gid)

Change the owner and group id of path to the numeric uid and gid.

 $\mathbf{chroot}(\mathit{path})$

Change root directory to path.

close(fd)

Close a file descriptor (for low level IO).

 $closerange(fd_low, fd_high)$

Closes all file descriptors in [fd_low, fd_high), ignoring errors.

confstr(name)

Return a string-valued system configuration variable.

Return Value

string

ctermid()

Return the name of the controlling terminal for this process.

Return Value

string

 $\mathbf{dup}(fd)$

Return a duplicate of a file descriptor.

Return Value

fd2

 $\mathbf{dup2}(\mathit{old_fd}, \mathit{new_fd})$

Duplicate file descriptor.

execl(file, *args)

Execute the executable file with argument list args, replacing the current process.

execle(file, env, *args)

Execute the executable file with argument list args and environment env, replacing the current process.

execlp(file, *args)

Execute the executable file (which is searched for along \$PATH) with argument list args, replacing the current process.

execlpe(file, env, *args)

Execute the executable file (which is searched for along \$PATH) with argument list args and environment env, replacing the current process.

execv(path, args)

Execute an executable path with arguments, replacing current process.

path: path of executable file
args: tuple or list of strings

execve(path, args, env)

Execute a path with arguments and environment, replacing current process.

path: path of executable file
args: tuple or list of arguments

env: dictionary of strings mapping to strings

execvp(file, args)

Execute the executable file (which is searched for along \$PATH) with argument list args, replacing the current process. args may be a list or tuple of strings.

execvpe(file, args, env)

Execute the executable file (which is searched for along \$PATH) with argument list args and environment env , replacing the current process. args may be a list or tuple of strings.

fchdir(fildes)

Change to the directory of the given file descriptor. fildes must be opened on a directory, not a file.

fchmod(fd, mode)

Change the access permissions of the file given by file descriptor fd.

fchown(fd, uid, gid)

Change the owner and group id of the file given by file descriptor fd to the numeric uid and gid.

fdopen(fd, mode='r', bufsize=...)

Return an open file object connected to a file descriptor.

Return Value

 $file_object$

fork()

Fork a child process. Return 0 to child process and PID of child to parent process.

Return Value

pid

forkpty()

Fork a new process with a new pseudo-terminal as controlling tty.

Like fork(), return 0 as pid to child process, and PID of child to parent. To both, return fd of newly opened pseudo-terminal.

Return Value

(pid, master_fd)

fpathconf(fd, name)

Return the configuration limit name for the file descriptor fd. If there is no limit, return -1.

Return Value

integer

fstat(fd)

Like stat(), but for an open file descriptor.

Return Value

stat result

fstatvfs(fd)

Perform an fstatvfs system call on the given fd.

Return Value

statvfs result

$\mathbf{fsync}(fildes)$

force write of file with filedescriptor to disk.

ftruncate(fd, length)

Truncate a file to a specified length.

$\mathbf{getcwd}()$

Return a string representing the current working directory.

Return Value

path

getcwdu()

Return a unicode string representing the current working directory.

Return Value

path

getegid()

Return the current process's effective group id.

Return Value

egid

getenv(key, default=None)

Get an environment variable, return None if it doesn't exist. The optional second argument can specify an alternate default.

geteuid()

Return the current process's effective user id.

Return Value

euid

getgid()

Return the current process's group id.

Return Value

gid

getgroups()

Return list of supplemental group IDs for the process.

Return Value

list of group IDs

getloadavg()

Return the number of processes in the system run queue averaged over the last 1, 5, and 15 minutes or raises OSError if the load average was unobtainable

Return Value

(float, float, float)

$\mathbf{getlogin}()$

Return the actual login name.

Return Value

string

getpgid(pid)

Call the system call getpgid().

Return Value

pgid

getpgrp()

Return the current process group id.

Return Value

pgrp

getpid()

Return the current process id

Return Value

pid

getppid()

Return the parent's process id.

Return Value

ppid

$\mathbf{getsid}(pid)$

Call the system call getsid().

Return Value

 sid

getuid()

Return the current process's user id.

Return Value

uid

initgroups(username, gid)

Call the system init groups() to initialize the group access list with all of the groups of which the specified username is a member, plus the specified group id.

Return Value

None

isatty(fd)

Return True if the file descriptor 'fd' is an open file descriptor connected to the slave end of a terminal.

Return Value

bool

kill(pid, sig)

Kill a process with a signal.

killpg(pgid, sig)

Kill a process group with a signal.

lchflags(path, flags)

Set file flags. This function will not follow symbolic links.

lchmod(path, mode)

Change the access permissions of a file. If path is a symlink, this affects the link itself rather than the target.

lchown(path, uid, gid)

Change the owner and group id of path to the numeric uid and gid. This function will not follow symbolic links.

link(src, dst)

Create a hard link to a file.

listdir(path)

Return a list containing the names of the entries in the directory.

path: path of directory to list

The list is in arbitrary order. It does not include the special entries '.' and '...' even if they are present in the directory.

Return Value

 $list_of_strings$

lseek(fd, pos, how)

Set the current position of a file descriptor. Return the new cursor position in bytes, starting from the beginning.

Return Value

newpos

lstat(path)

Like stat(path), but do not follow symbolic links.

Return Value

stat result

major(device)

Extracts a device major number from a raw device number.

Return Value

major number

makedev(major, minor)

Composes a raw device number from the major and minor device numbers.

Return Value

device number

makedirs(path, mode=0777)

Super-mkdir; create a leaf directory and all intermediate ones. Works like mkdir, except that any intermediate path segment (not just the rightmost) will be created if it does not exist. This is recursive.

minor(device)

Extracts a device minor number from a raw device number.

Return Value

minor number

mkdir(path, mode=0777)

Create a directory.

mkfifo(filename, mode=0666)

Create a FIFO (a POSIX named pipe).

mknod(filename, mode=0600, device=...)

Create a filesystem node (file, device special file or named pipe) named filename. mode specifies both the permissions to use and the type of node to be created, being combined (bitwise OR) with one of S_IFREG, S_IFCHR, S_IFBLK, and S_IFIFO. For S_IFCHR and S_IFBLK, device defines the newly created device special file (probably using os.makedev()), otherwise it is ignored.

nice(inc)

Decrease the priority of process by inc and return the new priority.

Return Value

 $new_priority$

$\mathbf{open}(\mathit{filename}, \mathit{flag}, \mathit{mode} = 0777)$

Open a file (for low level IO).

Return Value

 fd

openpty()

Open a pseudo-terminal, returning open fd's for both master and slave end.

Return Value

(master_fd, slave_fd)

pathconf(path, name)

Return the configuration limit name for the file or directory path. If there is no limit, return -1.

Return Value

integer

pipe()

Create a pipe.

Return Value

(read_end, write_end)

popen(command, mode='r', bufsize=...)

Open a pipe to/from a command returning a file object.

Return Value

pipe

popen2(cmd, mode='t', bufsize=-1)

Execute the shell command 'cmd' in a sub-process. On UNIX, 'cmd' may be a sequence, in which case arguments will be passed directly to the program without shell intervention (as with os.spawnv()). If 'cmd' is a string it will be passed to the shell (as with os.system()). If 'bufsize' is specified, it sets the buffer size for the I/O pipes. The file objects (child_stdin, child_stdout) are returned.

popen3(cmd, mode='t', bufsize=-1)

Execute the shell command 'cmd' in a sub-process. On UNIX, 'cmd' may be a sequence, in which case arguments will be passed directly to the program without shell intervention (as with os.spawnv()). If 'cmd' is a string it will be passed to the shell (as with os.system()). If 'bufsize' is specified, it sets the buffer size for the I/O pipes. The file objects (child_stdin, child_stdout, child_stderr) are returned.

popen4(cmd, mode='t', bufsize=-1)

Execute the shell command 'cmd' in a sub-process. On UNIX, 'cmd' may be a sequence, in which case arguments will be passed directly to the program without shell intervention (as with os.spawnv()). If 'cmd' is a string it will be passed to the shell (as with os.system()). If 'bufsize' is specified, it sets the buffer size for the I/O pipes. The file objects (child_stdin, child_stdout_stderr) are returned.

putenv(key, value)

Change or add an environment variable.

read(fd, buffersize)

Read a file descriptor.

Return Value

string

readlink(path)

Return a string representing the path to which the symbolic link points.

Return Value

path

remove(path)

Remove a file (same as unlink(path)).

removedirs(path)

Super-rmdir; remove a leaf directory and all empty intermediate ones. Works like rmdir except that, if the leaf directory is successfully removed, directories corresponding to rightmost path segments will be pruned away until either the whole path is consumed or an error occurs. Errors during this latter phase are ignored – they generally mean that a directory was not empty.

rename(old, new)

Rename a file or directory.

renames(old, new)

Super-rename; create directories as necessary and delete any left empty. Works like rename, except creation of any intermediate directories needed to make the new pathname good is attempted first. After the rename, directories corresponding to rightmost path segments of the old name will be pruned way until either the whole path is consumed or a nonempty directory is found.

Note: this function can fail with the new directory structure made if you lack permissions needed to unlink the leaf directory or file.

$\mathbf{rmdir}(path)$

Remove a directory.

setegid(gid)

Set the current process's effective group id.

seteuid(uid)

Set the current process's effective user id.

setgid(gid)

Set the current process's group id.

setgroups(list)

Set the groups of the current process to list.

$\mathbf{setpgid}(pid, pgrp)$

Call the system call setpgid().

setpgrp()

Make this process the process group leader.

setregid(rgid, egid)

Set the current process's real and effective group ids.

setreuid(ruid, euid)

Set the current process's real and effective user ids.

setsid()

Call the system call setsid().

setuid(uid)

Set the current process's user id.

spawnl(mode, file, *args)

Execute file with arguments from args in a subprocess. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnle(mode, file, env, *args)

Execute file with arguments from args in a subprocess with the supplied environment. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnlp(mode, file, *args)

Execute file (which is looked for along \$PATH) with arguments from args in a subprocess with the supplied environment. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnlpe(mode, file, env, *args)

Execute file (which is looked for along PATH) with arguments from args in a subprocess with the supplied environment. If mode $== P_NOWAIT$ return the pid of the process. If mode $== P_NOWAIT$ return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

$\mathbf{spawnv}(mode, file, args)$

Execute file with arguments from args in a subprocess. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnve(mode, file, args, env)

Execute file with arguments from args in a subprocess with the specified environment. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnvp(mode, file, args)

Execute file (which is looked for along \$PATH) with arguments from args in a subprocess. If mode == P_NOWAIT return the pid of the process. If mode == P_WAIT return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

spawnvpe(mode, file, args, env)

Execute file (which is looked for along PATH) with arguments from args in a subprocess with the supplied environment. If mode $== P_NOWAIT$ return the pid of the process. If mode $== P_WAIT$ return the process's exit code if it exits normally; otherwise return -SIG, where SIG is the signal that killed it.

Return Value

integer

stat(path)

Perform a stat system call on the given path.

Return Value

stat result

$stat_float_times(newval=...)$

Determine whether os.[lf]stat represents time stamps as float objects. If newval is True, future calls to stat() return floats, if it is False, future calls return ints. If newval is omitted, return the current setting.

Return Value

oldval

statvfs(path)

Perform a statvfs system call on the given path.

Return Value

statvfs result

strerror(code)

Translate an error code to a message string.

Return Value

string

$\mathbf{symlink}(\mathit{src}, \mathit{dst})$

Create a symbolic link pointing to src named dst.

sysconf(name)

Return an integer-valued system configuration variable.

Return Value

integer

system(command)

Execute the command (a string) in a subshell.

Return Value

 $exit_status$

$\mathbf{tcgetpgrp}(fd)$

Return the process group associated with the terminal given by a fd.

Return Value

pgid

tcsetpgrp(fd, pgid)

Set the process group associated with the terminal given by a fd.

tempnam(dir=..., prefix=...)

Return a unique name for a temporary file. The directory and a prefix may be specified as strings; they may be omitted or None if not needed.

Return Value

string

times()

Return a tuple of floating point numbers indicating process times.

Return Value

(utime, stime, cutime, cstime, elapsed_time)

tmpfile()

Create a temporary file with no directory entries.

Return Value

file object

tmpnam()

Return a unique name for a temporary file.

Return Value

string

ttyname(fd)

Return the name of the terminal device connected to 'fd'.

Return Value

string

$\mathbf{umask}(new_mask)$

Set the current numeric umask and return the previous umask.

Return Value

old_mask

uname()

Return a tuple identifying the current operating system.

Return Value

(sysname, nodename, release, version, machine)

$\mathbf{unlink}(path)$

Remove a file (same as remove(path)).

$\mathbf{unsetenv}(key)$

Delete an environment variable.

$\mathbf{urandom}(n)$

Return n random bytes suitable for cryptographic use.

Return Value

 str

utime(...)

utime(path, (atime, mtime)) utime(path, None)

Set the access and modified time of the file to the given values. If the second form is used, set the access and modified times to the current time.

wait()

Wait for completion of a child process.

Return Value

(pid, status)

wait3(options)

Wait for completion of a child process.

Return Value

(pid, status, rusage)

wait4(pid, options)

Wait for completion of a given child process.

Return Value

(pid, status, rusage)

waitpid(pid, options)

Wait for completion of a given child process.

Return Value

(pid, status)

Functions Module os

walk(top, topdown=True, onerror=None, followlinks=False)

Directory tree generator.

For each directory in the directory tree rooted at top (including top itself, but excluding '.' and '..'), yields a 3-tuple

dirpath, dirnames, filenames

dirpath is a string, the path to the directory. dirnames is a list of the names of the subdirectories in dirpath (excluding '.' and '..'). filenames is a list of the names of the non-directory files in dirpath. Note that the names in the lists are just names, with no path components. To get a full path (which begins with top) to a file or directory in dirpath, do os.path.join(dirpath, name).

If optional arg 'topdown' is true or not specified, the triple for a directory is generated before the triples for any of its subdirectories (directories are generated top down). If topdown is false, the triple for a directory is generated after the triples for all of its subdirectories (directories are generated bottom up).

When topdown is true, the caller can modify the dirnames list in-place (e.g., via del or slice assignment), and walk will only recurse into the subdirectories whose names remain in dirnames; this can be used to prune the search, or to impose a specific order of visiting. Modifying dirnames when topdown is false is ineffective, since the directories in dirnames have already been generated by the time dirnames itself is generated. No matter the value of topdown, the list of subdirectories is retrieved before the tuples for the directory and its subdirectories are generated.

By default errors from the os.listdir() call are ignored. If optional arg 'onerror' is specified, it should be a function; it will be called with one argument, an os.error instance. It can report the error to continue with the walk, or raise the exception to abort the walk. Note that the filename is available as the filename attribute of the exception object.

By default, os.walk does not follow symbolic links to subdirectories on systems that support them. In order to get this functionality, set the optional argument 'followlinks' to true.

Caution: if you pass a relative pathname for top, don't change the current working directory between resumptions of walk. walk never changes the current directory, and assumes that the client doesn't either.

Example:

```
import os
from os.path import join, getsize
for root, dirs, files in os.walk('python/Lib/email'):
    print root, "consumes",
    print sum([getsize(join(root, name)])7 for name in files]),
    print "bytes in", len(files), "non-directory files"
    if 'CVS' in dirs:
        dirs.remove('CVS') # don't visit CVS directories
```

Variables Module os

• , ,	(6 1	, .	,
write	td.	string	1
WI IUC	1009	001 0109	

Write a string to a file descriptor.

Return Value

byteswritten

4.2 Variables

Name	Description
EX_CANTCREAT	Value: 73
EX_CONFIG	Value: 78
EX_DATAERR	Value: 65
EX_IOERR	Value: 74
EX_NOHOST	Value: 68
EX_NOINPUT	Value: 66
EX_NOPERM	Value: 77
EX_NOUSER	Value: 67
EX_OK	Value: 0
EX_OSERR	Value: 71
EX_OSFILE	Value: 72
EX_PROTOCOL	Value: 76
EX_SOFTWARE	Value: 70
EX_TEMPFAIL	Value: 75
EX_UNAVAILABLE	Value: 69
EX_USAGE	Value: 64
F_OK	Value: 0
NGROUPS_MAX	Value: 16
O_APPEND	Value: 8
O_ASYNC	Value: 64
O_CREAT	Value: 512
O_DIRECTORY	Value: 1048576
O_DSYNC	Value: 4194304
O_EXCL	Value: 2048
O_EXLOCK	Value: 32
O_NDELAY	Value: 4
O_NOCTTY	Value: 131072
O_NOFOLLOW	Value: 256
O_NONBLOCK	Value: 4
O_RDONLY	Value: 0
O_RDWR	Value: 2
O_SHLOCK	Value: 16
O_SYNC	Value: 128
O_TRUNC	Value: 1024
O_WRONLY	Value: 1
R_OK	Value: 4
SEEK_CUR	Value: 1
SEEK_END	Value: 2
SEEK_SET	Value: 0
TMP_MAX	Value: 308915776
WCONTINUED	Value: 16
	continued on next page

Class OSError Module os

Name	Description
WNOHANG	Value: 1
WUNTRACED	Value: 2
W_OK	Value: 2
X_OK	Value: 1
altsep	Value: None
confstr_names	Value: {'CS_PATH': 1,
	'CS_XBS5_ILP32_OFF32_CFLAGS': 20, 'CS_XBS5
curdir	Value: '.'
defpath	Value: ':/bin:/usr/bin'
devnull	Value: '/dev/null'
environ	Value: {'GOPATH':
	'/usr/local/opt/go/libexec/bin', 'HOME':
	'/Use
extsep	Value: '.'
linesep	Value: '\n'
name	Value: 'posix'
pardir	Value: ''
pathconf_names	Value: {'PC_ASYNC_IO': 17,
	'PC_CHOWN_RESTRICTED': 7, 'PC_FILESIZ
pathsep	Value: ':'
sep	Value: '/'
sysconf_names	Value: {'SC_2_CHAR_TERM': 20, 'SC_2_C_BIND': 18,
	'SC_2_C_DEV': 1

4.3 Class OSError

```
object —
exceptions.BaseException —
exceptions.Exception —
exceptions.StandardError —
exceptions.EnvironmentError —
exceptions.OSError
```

OS system call failed.

4.3.1 Methods

```
__init__(...)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__
```

```
-_new__(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object.__new__
```

$Inherited\ from\ exceptions. Environment Error$

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

4.3.2 Properties

Name	Description
Inherited from exceptions.Er	$\overline{nvironmentError}$
errno, filename, strerror	
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

4.4 Class stat_result

stat_result: Result from stat or 1stat.

This object may be accessed either as a tuple of (mode, ino, dev, nlink, uid, gid, size, atime, mtime, ctime) or via the attributes st_mode, st_ino, st_dev, st_nlink, st_uid, and so on.

Posix/windows: If your platform supports st_blksize, st_blocks, st_rdev, or st_flags, they are available as attributes only.

See os.stat for more information.

4.4.1 Methods

 $\frac{\text{--add}_{\text{--}}(x, y)}{x+y}$

 $\frac{\text{_-contains}_{\text{_-}}(x, y)}{\text{y in x}}$

 $\frac{\mathbf{x} = \mathbf{q}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\begin{array}{c} --\mathbf{g}\mathbf{e}_{--}(x, y) \\ \mathbf{x} > = \mathbf{y} \end{array}$

 $\frac{\text{_-getitem}_{\text{--}}(x, y)}{x[y]}$

 $_$ getslice $_(x, i, j)$

x[i:j]

Use of negative indices is not supported.

 $\begin{bmatrix} -\mathbf{gt}_{--}(x, y) \\ \mathbf{x} > \mathbf{y} \end{bmatrix}$

 $_\mathtt{hash}_(x)$

hash(x)

Overrides: object._hash_

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

 $\frac{-\mathbf{len}_{--}(x)}{\mathbf{len}(\mathbf{x})}$

$-\mathbf{lt}_{-}(x, y)$	
x <y< td=""><td></td></y<>	

```
\frac{-\mathbf{mul}_{-}(x, n)}{x^*n}
```

```
 \frac{-\mathbf{ne}_{-}(x, y)}{x! = y}
```

```
\_new\_(T, S, ...)
```

Return Value

a new object with type S, a subtype of T

Overrides: object.__new__

 $__\mathbf{reduce}__(...)$

helper for pickle

Overrides: object._reduce_ extit(inherited documentation)

```
\frac{-\mathbf{repr}_{--}(x)}{\operatorname{repr}(x)}
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
\label{eq:condition} $$ $\operatorname{delattr}_{-}(), \operatorname{delattr}_{-}(), \operatorname{d
```

4.4.2 Properties

Name	Description
st_atime	time of last access
st_birthtime	time of creation
st_blksize	blocksize for filesystem I/O
st_blocks	number of blocks allocated
st_ctime	time of last change

Name	Description
st_dev	device
st_flags	user defined flags for file
st_gen	generation number
st_gid	group ID of owner
st_ino	inode
st_mode	protection bits
st_mtime	time of last modification
st_nlink	number of hard links
st_rdev	device type (if inode device)
st_size	total size, in bytes
st_uid	user ID of owner
Inherited from object	
class	

4.4.3 Class Variables

Name	Description
n_fields	Value: 19
n_sequence_fields	Value: 10
n_unnamed_fields	Value: 3

4.5 Class statvfs_result

object — posix.statvfs_result

statvfs_result: Result from statvfs or fstatvfs.

This object may be accessed either as a tuple of (bsize, frsize, blocks, bfree, bavail, files, ffree, favail, flag, namemax), or via the attributes f_bsize, f_frsize, f_blocks, f_bfree, and so on.

See os.statvfs for more information.

4.5.1 Methods

$_$ add $_$ (x, y)	
x+y	

 $\frac{\text{_-contains}_{\text{_-}}(x, y)}{\text{y in x}}$

 $\frac{-\mathbf{eq}_{-}(x, y)}{x = = y}$

 $\frac{-\mathbf{ge}_{-}(x, y)}{x > = y}$

 $\frac{\text{_-getitem}_{--}(x, y)}{x[y]}$

 $\frac{\text{__getslice}_{\text{_}}(x, i, j)}{\mathbf{x}[i:j]}$

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{-}(x, y)}{x>y}$

 $\frac{_\mathbf{hash}_(x)}{\mathsf{hash}(\mathbf{x})}$ Overrides: object.__hash__

 $\frac{- \mathbf{le}_{-}(x, y)}{x <= y}$

 $\frac{-\mathbf{len}_{-}(x)}{\mathrm{len}(\mathbf{x})}$

 $\frac{-\mathbf{1}\mathbf{t}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$

 $\frac{-\mathbf{mul}_{--}(x, n)}{\mathbf{x}^*\mathbf{n}}$



__new__(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

 $_{-}$ **repr** $_{--}(x)$

repr(x)

Overrides: object._repr_

 $\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}$

Inherited from object

```
\label{lem:condition} $$ $\_-delattr_-(), \_-format_-(), \_-getattribute_-(), \_-init_-(), \_-reduce_ex_-(), \_-setattr_-(), \_-sizeof_-(), \_-str_-(), \_-subclasshook_-() $
```

4.5.2 Properties

Name	Description
f_bavail	
f_bfree	
f_blocks	
f_bsize	
f_favail	
f_ffree	
f_files	
f_flag	
f_frsize	
f_namemax	
Inherited from object	
class	

4.5.3 Class Variables

Name	Description
n_fields	Value: 10
n_sequence_fields	Value: 10
$n_unnamed_fields$	Value: 0

5 Module pickle

Create portable serialized representations of Python objects.

```
See module cPickle for a (much) faster implementation.
See module copy_reg for a mechanism for registering custom picklers.
See module pickletools source for extensive comments.
```

Classes:

Pickler Unpickler

Functions:

```
dump(object, file)
dumps(object) -> string
load(file) -> object
loads(string) -> object
```

Misc variables:

__version__ format_version compatible_formats

Version: \$Revision: 72223 \$

5.1 Functions

```
\begin{array}{|l|} \hline \mathbf{dump}(\mathit{obj}, \mathit{file}, \mathit{protocol} = \mathtt{None}) \\ \hline \\ \mathbf{dumps}(\mathit{obj}, \mathit{protocol} = \mathtt{None}) \\ \hline \\ \mathbf{load}(\mathit{file}) \\ \hline \\ \hline \\ \mathbf{loads}(\mathit{str}) \end{array}
```

5.2 Variables

Variables Module pickle

Name	Description
APPEND	Value: 'a'
APPENDS	Value: 'e'
BINFLOAT	Value: 'G'
BINGET	Value: 'h'
BININT	Value: 'J'
BININT1	Value: 'K'
BININT2	Value: 'M'
BINPERSID	Value: 'Q'
BINPUT	Value: 'q'
BINSTRING	Value: 'T'
BINUNICODE	Value: 'X'
BUILD	Value: 'b'
DICT	Value: 'd'
DUP	Value: '2'
EMPTY_DICT	Value: '}'
EMPTY_LIST	Value: ']'
EMPTY_TUPLE	Value: ')'
EXT1	Value: '\x82'
EXT2	Value: '\x83'
EXT4	Value: '\x84'
FALSE	Value: 'I00\n'
FLOAT	Value: 'F'
GET	Value: 'g'
GLOBAL	Value: 'c'
HIGHEST_PROTOCOL	Value: 2
INST	Value: 'i'
INT	Value: 'I'
LIST	Value: '1'
LONG	Value: 'L'
LONG1	Value: '\x8a'
LONG4	Value: '\x8b'
LONG_BINGET	Value: 'j'
LONG_BINPUT	Value: 'r'
MARK	Value: '('
NEWFALSE	Value: '\x89'
NEWOBJ	Value: '\x81'
NEWTRUE	Value: '\x88'
NONE	Value: 'N'
OBJ	Value: 'o'
PERSID	Value: 'P'
POP	Value: '0'
POP_MARK	Value: '1'

Class PickleError Module pickle

Name	Description
PROTO	Value: '\x80'
PUT	Value: 'p'
REDUCE	Value: 'R'
SETITEM	Value: 's'
SETITEMS	Value: 'u'
SHORT_BINSTRING	Value: 'U'
STOP	Value: '.'
STRING	Value: 'S'
TRUE	Value: 'I01\n'
TUPLE	Value: 't'
TUPLE1	Value: '\x85'
TUPLE2	Value: '\x86'
TUPLE3	Value: '\x87'
UNICODE	Value: 'V'

5.3 Class PickleError

Known Subclasses: pickle.PicklingError, pickle.UnpicklingError

A common base class for the other pickling exceptions.

5.3.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

Class Pickler Module pickle

5.3.2 Properties

Name	Description
Inherited from exceptions. Bo	iseException
args, message	
Inherited from object	
class	

5.4 Class Pickler

5.4.1 Methods

$_init_(self, file, protocol = None)$

This takes a file-like object for writing a pickle data stream.

The optional protocol argument tells the pickler to use the given protocol; supported protocols are 0, 1, 2. The default protocol is 0, to be backwards compatible. (Protocol 0 is the only protocol that can be written to a file opened in text mode and read back successfully. When using a protocol higher than 0, make sure the file is opened in binary mode, both when pickling and unpickling.)

Protocol 1 is more efficient than protocol 0; protocol 2 is more efficient than protocol 1.

Specifying a negative protocol version selects the highest protocol version supported. The higher the protocol used, the more recent the version of Python needed to read the pickle produced.

The file parameter must have a write() method that accepts a single string argument. It can thus be an open file object, a StringIO object, or any other custom object that meets this interface.

$clear_memo(self)$

Clears the pickler's "memo".

The memo is the data structure that remembers which objects the pickler has already seen, so that shared or recursive objects are pickled by reference and not by value. This method is useful when re-using picklers.

$\mathbf{dump}(self, obj)$

Write a pickled representation of obj to the open file.

Class Pickler Module pickle

 $\mathbf{get}(\mathit{self}, \mathit{i}, \mathit{pack} {=} {<} \mathtt{built-in function pack}{>})$

memoize(self, obj)

Store an object in the memo.

persistent_id(self, obj)

put(self, i, pack=<built-in function pack>)

 $\mathbf{save}(self, obj)$

 $save_bool(self, obj)$

save_dict(self, obj)

save_empty_tuple(self, obj)

save_float(self, obj, pack=<built-in function pack>)

save_global(self, obj, name=None, pack=<built-in function pack>)

 $\mathbf{save_inst}(\mathit{self}, \mathit{obj})$

save_int(self, obj, pack=<built-in function pack>)

save_list(self, obj)

save_long(self, obj, pack=<built-in function pack>)

 $save_none(self, obj)$

save_pers(self, pid)

 $save_reduce(self, func, args, state=None, listitems=None, dictitems=None, obj=None)$

save_string(self, obj, pack=<built-in function pack>)

Class PicklingError Module pickle

```
\mathbf{save\_tuple}(\mathit{self}, \mathit{obj})
```

```
save_unicode(self, obj, pack=<built-in function pack>)
```

5.4.2 Class Variables

Name	Description
dispatch	Value: { <type 'bool'="">: <function< th=""></function<></type>
	save_bool at 0x1021342a8>, <typ< th=""></typ<>

5.5 Class PicklingError

This exception is raised when an unpicklable object is passed to the dump() method.

5.5.1 Methods

$Inherited\ from\ exceptions. Exception$

$Inherited\ from\ exceptions. Base Exception$

```
\label{eq:continuous} $$\_\_delattr_{-}(), \_\_getattribute_{-}(), \_\_getattr_{-}(), \_\_getattr_{-}(), \_\_reduce_{-}(), \_\_repr_{-}(), \_\_setattr_{-}(), \_\_setstate_{-}(), \_\_setstate_{-}(), \_\_unicode_{-}()
```

Inherited from object

$$_format_(), \ _hash_(), \ _reduce_ex_(), \ _sizeof_(), \ _subclasshook_()$$

5.5.2 Properties

Class Unpickler Module pickle

Name	Description
Inherited from exceptions. Be	iseException
args, message	
Inherited from object	
class	

5.6 Class Unpickler

5.6.1 Methods

 $_$ **init** $_$ (self, file)

This takes a file-like object for reading a pickle data stream.

The protocol version of the pickle is detected automatically, so no proto argument is needed.

The file-like object must have two methods, a read() method that takes an integer argument, and a readline() method that requires no arguments. Both methods should return a string. Thus file-like object can be a file object opened for reading, a StringIO object, or any other custom object that meets this interface.

find_class(self, module, name)

get_extension(self, code)

load(self)

Read a pickled object representation from the open file.

Return the reconstituted object hierarchy specified in the file.

 $load_append(self)$

 $load_appends(self)$

load_binfloat(self, unpack=<built-in function unpack>)

 $load_binget(self)$

 $load_binint(self)$

Class Unpickler Module pickle

$\boxed{\mathbf{load_binint1}(\mathit{self})}$
$load_binint2(self)$
$\boxed{\mathbf{load_binpersid}(\mathit{self})}$
$oxed{\mathbf{load_binput}(self)}$
$\boxed{\mathbf{load_binstring}(\mathit{self})}$
$load_binunicode(self)$
2000_52120200 (000y)
$\boxed{\mathbf{load_build}(\mathit{self})}$
$load_dict(self)$
$load_dup(self)$
Total_dap(self)
$\boxed{\mathbf{load_empty_dictionary}(\mathit{self})}$
$\boxed{\mathbf{load_empty_list}(\mathit{self})}$
$\boxed{\mathbf{load_empty_tuple}(\mathit{self})}$
loud_empty_tuple(sety)
$load_eof(self)$
$\boxed{\mathbf{load_ext1}(\mathit{self})}$
$load_ext2(self)$
Total Sold (Sold)
$\boxed{\mathbf{load_ext4}(\mathit{self})}$
$load_false(self)$
$load_float(self)$
$\boxed{\mathbf{load_get}(\mathit{self})}$
load mlabel(self)
$load_global(self)$

Class Unpickler Module pickle

$load_inst(\mathit{self})$
$load_int(\mathit{self})$
$load_list(self)$
$\boxed{\mathbf{load_long}(\mathit{self})}$
$\boxed{\mathbf{load_long1}(\mathit{self})}$
$\boxed{\mathbf{load_long4}(\mathit{self})}$
$\boxed{\mathbf{load_long_binget}(\mathit{self})}$
${\bf load_long_binput}(self)$
$\mathbf{load_mark}(self)$
$\boxed{\mathbf{load_newobj}(\mathit{self})}$
$load_none(self)$
$\mathbf{load_obj}(self)$
$\mathbf{load_persid}(self)$
$\mathbf{load_pop}(self)$
$\boxed{\mathbf{load_pop_mark}(\mathit{self})}$
$\boxed{\mathbf{load_proto}(\mathit{self})}$
$\boxed{\mathbf{load_put}(\mathit{self})}$
$\boxed{\mathbf{load_reduce}(\mathit{self})}$
$\boxed{\mathbf{load_setitem}(\mathit{self})}$
$\boxed{\mathbf{load_setitems}(\mathit{self})}$

$\boxed{\mathbf{load_short_binstring}(\mathit{self})}$
$load_stop(self)$
$load_string(self)$
$\boxed{\mathbf{load_true}(\mathit{self})}$
$\boxed{\mathbf{load_tuple}(\mathit{self})}$
$\boxed{\mathbf{load_tuple1}(\mathit{self})}$
$\boxed{\mathbf{load_tuple2}(\mathit{self})}$
${\bf load_tuple3}(self)$
$\boxed{\mathbf{load_unicode}(\mathit{self})}$
marker(self)

5.6.2 Class Variables

Name	Description
dispatch	Value: {'': <function at<="" load_eof="" th=""></function>
	0x102134b90>, '(': <function l<="" th=""></function>

5.7 Class UnpicklingError

```
object —
exceptions.BaseException —
exceptions.Exception —
pickle.PickleError —
pickle.UnpicklingError
```

This exception is raised when there is a problem unpickling an object, such as a security violation.

Note that other exceptions may also be raised during unpickling, including (but not necessarily limited to) AttributeError, EOFError, ImportError, and IndexError.

5.7.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

$$\label{eq:control_control_control} $$ $$ _delattr_(), _getattribute_(), _getatte_(), _getatte_(), _reduce_(), _repr_(), _setattr_(), _setstate_(), _str_(), _unicode_() $$$

Inherited from object

5.7.2 Properties

Name	Description
Inherited from exceptions. Bo	iseException
args, message	
Inherited from object	
class	

6 Module posixpath

Common operations on Posix pathnames.

Instead of importing this module directly, import os and refer to this module as os.path. The "os.path" name is an alias for this module on Posix systems; on other systems (e.g. Mac, Windows), os.path provides the same operations in a manner specific to that platform, and is an alias to another module (e.g. macpath, ntpath).

Some of this can actually be useful on non-Posix systems too, e.g. for manipulation of the pathname component of URLs.

6.1 Functions

abspath(path)

Return an absolute path.

basename(p)

Returns the final component of a pathname

commonprefix(m)

Given a list of pathnames, returns the longest common leading component

dirname(p)

Returns the directory component of a pathname

exists(path)

Test whether a path exists. Returns False for broken symbolic links

expanduser(path)

Expand ~ and ~user constructions. If user or \$HOME is unknown, do nothing.

expandvars(path)

Expand shell variables of form \$var and \${var}. Unknown variables are left unchanged.

getatime(filename)

Return the last access time of a file, reported by os.stat().

Functions Module posixpath

getctime(filename)

Return the metadata change time of a file, reported by os.stat().

getmtime(filename)

Return the last modification time of a file, reported by os.stat().

getsize(filename)

Return the size of a file, reported by os.stat().

isabs(s)

Test whether a path is absolute

isdir(s)

Return true if the pathname refers to an existing directory.

isfile(path)

Test whether a path is a regular file

islink(path)

Test whether a path is a symbolic link

ismount(path)

Test whether a path is a mount point

$\mathbf{join}(a, *p)$

Join two or more pathname components, inserting '/' as needed. If any component is an absolute path, all previous path components will be discarded. An empty last part will result in a path that ends with a separator.

lexists(path)

Test whether a path exists. Returns True for broken symbolic links

$\mathbf{normcase}(s)$

Normalize case of pathname. Has no effect under Posix

Functions Module posixpath

normpath(path)

Normalize path, eliminating double slashes, etc.

realpath(filename)

Return the canonical path of the specified filename, eliminating any symbolic links encountered in the path.

relpath(path, start=',.')

Return a relative version of a path

$\mathbf{samefile}(f1, f2)$

Test whether two pathnames reference the same actual file

sameopenfile(fp1, fp2)

Test whether two open file objects reference the same file

$\mathbf{samestat}(s1, s2)$

Test whether two stat buffers reference the same file

$\mathbf{split}(p)$

Split a pathname. Returns tuple "(head, tail)" where "tail" is everything after the final slash. Either part may be empty.

splitdrive(p)

Split a pathname into drive and path. On Posix, drive is always empty.

$\mathbf{splitext}(p)$

Split the extension from a pathname.

Extension is everything from the last dot to the end, ignoring leading dots. Returns "(root, ext)"; ext may be empty.

Variables Module posixpath

$\mathbf{walk}(top, func, arg)$

Directory tree walk with callback function.

For each directory in the directory tree rooted at top (including top itself, but excluding '.' and '..'), call func(arg, dirname, fnames). dirname is the name of the directory, and fnames a list of the names of the files and subdirectories in dirname (excluding '.' and '..'). func may modify the fnames list in-place (e.g. via del or slice assignment), and walk will only recurse into the subdirectories whose names remain in fnames; this can be used to implement a filter, or to impose a specific order of visiting. No semantics are defined for, or required of, arg, beyond that arg is always passed to func. It can be used, e.g., to pass a filename pattern, or a mutable object designed to accumulate statistics. Passing None for arg is common.

6.2 Variables

Name	Description
altsep	Value: None
curdir	Value: '.'
defpath	Value: ':/bin:/usr/bin'
devnull	Value: '/dev/null'
extsep	Value: '.'
pardir	Value: ''
pathsep	Value: ':'
sep	Value: '/'
supports_unicode_filename-	Value: True
S	

7 Package pygame

Pygame is a set of Python modules designed for writing games. It is written on top of the excellent SDL library. This allows you to create fully featured games and multimedia programs in the python language. The package is highly portable, with games running on Windows, MacOS, OS X, BeOS, FreeBSD, IRIX, and Linux.

Version: 1.9.2a0

7.1 Functions

packager_imports()
some additional imports that py2app/py2exe will want to see

$\mathbf{warn_unwanted_files}()$
warn about unneeded old files

7.2 Variables

Name	Description
ACTIVEEVENT	Value: 1
ANYFORMAT	Value: 268435456
ASYNCBLIT	Value: 4
AUDIO_S16	Value: 32784
AUDIO_S16LSB	Value: 32784
AUDIO_S16MSB	Value: 36880
AUDIO_S16SYS	Value: 32784
AUDIO_S8	Value: 32776
AUDIO_U16	Value: 16
AUDIO_U16LSB	Value: 16
AUDIO_U16MSB	Value: 4112
AUDIO_U16SYS	Value: 16
AUDIO_U8	Value: 8
BIG_ENDIAN	Value: 4321
BLEND_ADD	Value: 1
BLEND_MAX	Value: 5
BLEND_MIN	Value: 4
BLEND_MULT	Value: 3
BLEND_PREMULTIPLI-	Value: 17
ED	
BLEND_RGBA_ADD	Value: 6

Name	Description
BLEND_RGBA_MAX	Value: 16
BLEND_RGBA_MIN	Value: 9
BLEND_RGBA_MULT	Value: 8
BLEND_RGBA_SUB	Value: 7
BLEND_RGB_ADD	Value: 1
BLEND_RGB_MAX	Value: 5
BLEND_RGB_MIN	Value: 4
BLEND_RGB_MULT	Value: 3
BLEND_RGB_SUB	Value: 2
BLEND_SUB	Value: 2
BUTTON_X1	Value: 6
BUTTON_X2	Value: 7
DOUBLEBUF	Value: 1073741824
FULLSCREEN	Value: -2147483648
GL_ACCELERATED_VIS-	Value: 15
UAL	
GL_ACCUM_ALPHA_SIZ-	Value: 11
E	
GL_ACCUM_BLUE_SIZE	Value: 10
GL_ACCUM_GREEN_SIZ-	Value: 9
E	
GL_ACCUM_RED_SIZE	Value: 8
GL_ALPHA_SIZE	Value: 3
GL_BLUE_SIZE	Value: 2
GL_BUFFER_SIZE	Value: 4
GL_DEPTH_SIZE	Value: 6
GL_DOUBLEBUFFER	Value: 5
GL_GREEN_SIZE	Value: 1
GL_MULTISAMPLEBUF-	Value: 13
FERS	
GL_MULTISAMPLESAM-	Value: 14
PLES	
GL_RED_SIZE	Value: 0
GL_STENCIL_SIZE	Value: 7
GL_STEREO	Value: 12
GL_SWAP_CONTROL	Value: 16
HAT_CENTERED	Value: 0
HAT_DOWN	Value: 4
HAT_LEFT	Value: 8
HAT_LEFTDOWN	Value: 12
HAT_LEFTUP	Value: 9
HAT_RIGHT	Value: 2

Name	Description
HAT_RIGHTDOWN	Value: 6
HAT_RIGHTUP	Value: 3
HAT_UP	Value: 1
HAVE_NEWBUF	Value: 1
HWACCEL	Value: 256
HWPALETTE	Value: 536870912
HWSURFACE	Value: 1
IYUV_OVERLAY	Value: 1448433993
JOYAXISMOTION	Value: 7
JOYBALLMOTION	Value: 8
JOYBUTTONDOWN	Value: 10
JOYBUTTONUP	Value: 11
JOYHATMOTION	Value: 9
KEYDOWN	Value: 2
KEYUP	Value: 3
KMOD_ALT	Value: 768
KMOD_CAPS	Value: 8192
KMOD_CTRL	Value: 192
KMOD_LALT	Value: 256
KMOD_LCTRL	Value: 64
KMOD_LMETA	Value: 1024
KMOD_LSHIFT	Value: 1
KMOD_META	Value: 3072
KMOD_MODE	Value: 16384
KMOD_NONE	Value: 0
KMOD_NUM	Value: 4096
KMOD_RALT	Value: 512
KMOD_RCTRL	Value: 128
KMOD_RMETA	Value: 2048
KMOD_RSHIFT	Value: 2
KMOD_SHIFT	Value: 3
$K_{-}0$	Value: 48
K_1	Value: 49
K_2	Value: 50
K_3	Value: 51
K_4	Value: 52
K_5	Value: 53
K_6	Value: 54
K_7	Value: 55
K_8	Value: 56
K_9	Value: 57
K_AMPERSAND	Value: 38

Name	Description
K_ASTERISK	Value: 42
K_AT	Value: 64
K_BACKQUOTE	Value: 96
K_BACKSLASH	Value: 92
K_BACKSPACE	Value: 8
K_BREAK	Value: 318
K_CAPSLOCK	Value: 301
K_CARET	Value: 94
K_CLEAR	Value: 12
K_COLON	Value: 58
K_COMMA	Value: 44
K_DELETE	Value: 127
K_DOLLAR	Value: 36
K_DOWN	Value: 274
K_END	Value: 279
K_EQUALS	Value: 61
K_ESCAPE	Value: 27
K_EURO	Value: 321
K_EXCLAIM	Value: 33
K_F1	Value: 282
K_F10	Value: 291
K_F11	Value: 292
K_F12	Value: 293
K_F13	Value: 294
K_F14	Value: 295
K_F15	Value: 296
K_F2	Value: 283
K_F3	Value: 284
K_F4	Value: 285
K_F5	Value: 286
K_F6	Value: 287
$K_{-}F7$	Value: 288
K_F8	Value: 289
K_F9	Value: 290
K_FIRST	Value: 0
K_GREATER	Value: 62
K_HASH	Value: 35
K_HELP	Value: 315
K_HOME	Value: 278
K_INSERT	Value: 277
K_KP0	Value: 256
K_KP1	Value: 257

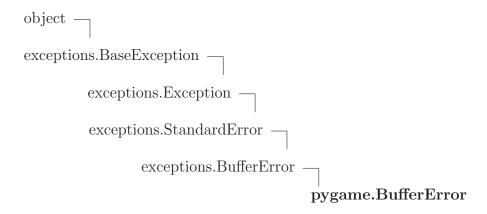
Name	Description
K_KP2	Value: 258
K_KP3	Value: 259
K_KP4	Value: 260
K_KP5	Value: 261
K_KP6	Value: 262
K_KP7	Value: 263
K_KP8	Value: 264
K_KP9	Value: 265
K_KP_DIVIDE	Value: 267
K_KP_ENTER	Value: 271
K_KP_EQUALS	Value: 272
K_KP_MINUS	Value: 269
K_KP_MULTIPLY	Value: 268
K_KP_PERIOD	Value: 266
K_KP_PLUS	Value: 270
K_LALT	Value: 308
K_LAST	Value: 323
K_LCTRL	Value: 306
K_LEFT	Value: 276
K_LEFTBRACKET	Value: 91
K_LEFTPAREN	Value: 40
K_LESS	Value: 60
K_LMETA	Value: 310
K_LSHIFT	Value: 304
K_LSUPER	Value: 311
K_MENU	Value: 319
K_MINUS	Value: 45
K_MODE	Value: 313
K_NUMLOCK	Value: 300
K_PAGEDOWN	Value: 281
K_PAGEUP	Value: 280
K_PAUSE	Value: 19
K_PERIOD	Value: 46
K_PLUS	Value: 43
K_POWER	Value: 320
K_PRINT	Value: 316
K_QUESTION	Value: 63
K_QUOTE	Value: 39
K_QUOTEDBL	Value: 34
K_RALT	Value: 307
K_RCTRL	Value: 305
K_RETURN	Value: 13

Name	Description
K_RIGHT	Value: 275
K_RIGHTBRACKET	Value: 93
K_RIGHTPAREN	Value: 41
K_RMETA	Value: 309
K_RSHIFT	Value: 303
K_RSUPER	Value: 312
K_SCROLLOCK	Value: 302
K_SEMICOLON	Value: 59
K_SLASH	Value: 47
K_SPACE	Value: 32
K_SYSREQ	Value: 317
K_TAB	Value: 9
K_UNDERSCORE	Value: 95
K_UNKNOWN	Value: 0
K_UP	Value: 273
K_a	Value: 97
K_b	Value: 98
K_c	Value: 99
K_d	Value: 100
K_e	Value: 101
K_f	Value: 102
K_g	Value: 103
K_h	Value: 104
K_i	Value: 105
K_j	Value: 106
K_k	Value: 107
K.l	Value: 108
K_m	Value: 109
K_n	Value: 110
K_o	Value: 111
K_p	Value: 112
K_q	Value: 113
K_r	Value: 114
K_s	Value: 115
K_t	Value: 116
K_u	Value: 117
K_v	Value: 118
K_w	Value: 119
K_x	Value: 120
K_y	Value: 121
K_z	Value: 122
LIL_ENDIAN	Value: 1234

Name	Description
MOUSEBUTTONDOWN	Value: 5
MOUSEBUTTONUP	Value: 6
MOUSEMOTION	Value: 4
NOEVENT	Value: 0
NOFRAME	Value: 32
NUMEVENTS	Value: 32
OPENGL	Value: 2
OPENGLBLIT	Value: 10
PREALLOC	Value: 16777216
QUIT	Value: 12
RESIZABLE	Value: 16
RLEACCEL	Value: 16384
RLEACCELOK	Value: 8192
SCRAP_BMP	Value: 'image/bmp'
SCRAP_CLIPBOARD	Value: 0
SCRAP_PBM	Value: 'image/pbm'
SCRAP_PPM	Value: 'image/ppm'
SCRAP_SELECTION	Value: 1
SCRAP_TEXT	Value: 'text/plain'
SRCALPHA	Value: 65536
SRCCOLORKEY	Value: 4096
SWSURFACE	Value: 0
SYSWMEVENT	Value: 13
TIMER_RESOLUTION	Value: 10
USEREVENT	Value: 24
USEREVENT_DROPFIL-	Value: 4096
E	
UYVY_OVERLAY	Value: 1498831189
VIDEOEXPOSE	Value: 17
VIDEORESIZE	Value: 16
YUY2_OVERLAY	Value: 844715353
YV12_OVERLAY	Value: 842094169
YVYU_OVERLAY	Value: 1431918169
package	Value: 'pygame'
movie	Value: ??
rev	Value: 'cdb77d20ee8e'
ver	Value: '1.9.2a0'
vernum	Value: (1, 9, 2)

Class BufferProxy Package pygame

7.3 Class BufferError



7.3.1 Methods

$Inherited\ from\ exceptions. Buffer Error$

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

$$_format_(), _hash_(), _reduce_ex_(), _sizeof_(), _subclasshook_()$$

7.3.2 Properties

Name	Description
Inherited from exceptions. Bo	seException
args, message	
Inherited from object	
class	

7.4 Class BufferProxy

Class BufferProxy Package pygame

BufferProxy(<parent>) -> BufferProxy pygame object to export a surface buffer through an array protocol

7.4.1 Methods

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object.__new__

 $\frac{__\mathbf{repr}__(x)}{\mathrm{repr}(\mathbf{x})}$ Overrides: object. $_$ repr $_$

Write(buffer, offset=0)
Write raw bytes to object buffer.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

7.4.2 Properties

Name	Description
_array_interface	Version 3 array interface, Python level
_array_struct	Version 3 array interface, C level
length	length -> int The size, in bytes, of the exported
	buffer.
parent	parent -> Surface parent -> <parent> Return</parent>
	wrapped exporting object.
raw	raw -> bytes A copy of the exported buffer as a
	single block of bytes.
Inherited from object	
class	

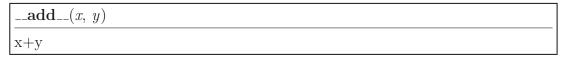
Class Color Package pygame

7.5 Class Color

object — pygame.Color

 $\label{eq:color} {\it Color}(name) \mathrel{->} {\it Color}(r,\;g,\;b,\;a) \mathrel{->} {\it Color}(rgbvalue) \mathrel{->} {\it Color}\;pygame\;object\;for\;color\;representations}$

7.5.1 Methods



 $\frac{_\text{coerce}_{_}(x, y)}{\text{coerce}(x, y)}$

 $\frac{\text{_-delitem}_{\text{--}}(x, y)}{\text{del } x[y]}$

 $\frac{-\mathbf{div}_{--}(x, y)}{x/y}$

 $\frac{\mathbf{q}_{--}(x, y)}{\mathbf{x} = -\mathbf{y}}$

 $\frac{\text{_-float}_{--}(x)}{\text{float}(x)}$

 $\frac{\text{_-floordiv}_{--}(x, y)}{x//y}$

 $\frac{-\mathbf{g}\mathbf{e}_{--}(x, y)}{\mathbf{x} > = \mathbf{y} }$

 $\frac{-\text{getitem}_{--}(x, y)}{x[y]}$

Class Color Package pygame

```
_{-}getslice_{-}(x, i, j)
x[i:j]
Use of negative indices is not supported.
-gt_{-}(x, y)
x>y
-\mathbf{hex}_{-}(x)
hex(x)
__index__(...)
x[y:z] \le x[y._index_():z._index_()]
_{-}int_{-}(x)
int(x)
_{-}invert_{-}(x)
^{\sim}X
-\mathbf{le}_{-}(x, y)
x \le y
-len-(x)
len(x)
_{-}long_{-}(x)
long(x)
-\mathbf{lt}_{-}(x, y)
x < y
-\mathbf{mod}_{--}(x, y)
x\%y
```

Class Color Package pygame

```
_{-}mul_{-}(x, y)
x*y
-\mathbf{ne}_{-}(x, y)
x!=y
__new__(T, S, ...)
Return Value
     a new object with type S, a subtype of T
Overrides: object.\_new\_
-\mathbf{oct}_{--}(x)
oct(x)
_{-}radd_{-}(x, y)
y+x
_{-}rdiv_{-}(x, y)
y/x
_{-}\mathbf{repr}_{-}(x)
repr(x)
Overrides: object._repr_
_{-}rfloordiv_{-}(x, y)
y//x
\_rmod\_(x, y)
y%x
_{-}rmul_{-}(x, y)
y^*x
```

 $_{-}$ **rsub** $_{-}$ (x, y)

у-х

Class Color Package pygame

$_$ setitem $_(x, i, y)$
x[i]=y

```
\frac{\text{_--sub}_{\text{_--}}(x, y)}{\text{x-y}}
```

$correct_gamma(...)$

correct_gamma (gamma) -> Color Applies a certain gamma value to the Color.

normalize()

Returns the normalized RGBA values of the Color.

Return Value

tuple

$set_length(len)$

Set the number of elements in the Color to 1,2,3, or 4.

Return Value

None

Inherited from object

7.5.2 Properties

Name	Description
_array_struct	array structure interface, read only
a	a -> int Gets or sets the alpha value of the
	Color.
b	b -> int Gets or sets the blue value of the Color.
cmy	cmy -> tuple Gets or sets the CMY
	representation of the Color.
g	g -> int Gets or sets the green value of the
	Color.
hsla	hsla -> tuple Gets or sets the HSLA
	representation of the Color.
hsva	hsva -> tuple Gets or sets the HSVA
	representation of the Color.

continued on next page

Class Overlay Package pygame

Name	Description
i1i2i3	i1i2i3 -> tuple Gets or sets the I1I2I3
	representation of the Color.
r	r -> int Gets or sets the red value of the Color.
Inherited from object	
class	

7.6 Class Overlay

object — pygame.Overlay

Overlay(format, (width, height)) -> Overlay pygame object for video overlay graphics

7.6.1 Methods

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

display(...)

display((y, u, v)) -> None display() -> None set the overlay pixel data

$get_hardware(rect)$

test if the Overlay is hardware accelerated

Return Value

int

$set_location(rect)$

control where the overlay is displayed

Return Value

None

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

Class PixelArray Package pygame

7.6.2 Properties

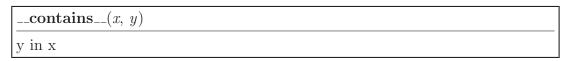
Name	Description
Inherited from object	
class	

7.7 Class PixelArray

object — pygame.PixelArray

PixelArray(Surface) -> PixelArray pygame object for direct pixel access of surfaces

7.7.1 Methods



 $\frac{\text{_-delitem}_{--}(x, y)}{\text{del } x[y]}$

 $\frac{\text{_-getitem}_{\text{_-}}(x, y)}{x[y]}$

 $\frac{-\text{iter}_{-}(x)}{\text{iter}(x)}$

 $\frac{-\mathbf{len}_{--}(x)}{\mathrm{len}(\mathbf{x})}$

__new__(*T*, *S*, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

Class PixelArray Package pygame

 $_{-}\mathbf{repr}_{-}(x)$

repr(x)

Overrides: object._repr__

 $_$ setitem $_(x, i, y)$

x[i]=y

compare(array, distance=0, weights=(0.299, 0.587, 0.114))

Compares the PixelArray with another one.

Return Value

PixelArray

extract(color, distance=0, weights=(0.299, 0.587, 0.114))

Extracts the passed color from the PixelArray.

Return Value

PixelArray

make_surface()

Creates a new Surface from the current PixelArray.

Return Value

Surface

 $\mathbf{replace}(\mathit{color}, \mathit{repcolor}, \mathit{distance} = \mathtt{0}, \mathit{weights} = \mathtt{(0.299}, \mathit{0.587}, \mathit{0.114}))$

Replaces the passed color in the PixelArray with another one.

Return Value

None

transpose()

Exchanges the x and y axis.

Return Value

PixelArray

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

7.7.2 Properties

Name	Description
_array_interface	Version 3
_array_struct	Version 3
itemsize	itemsize -> int Returns the byte size of a pixel
	array item
ndim	ndim -> int Returns the number of dimensions.
shape	shape -> tuple of int's Returns the array size.
strides	strides -> tuple of int's Returns byte offsets for
	each array dimension.
surface	surface -> Surface Gets the Surface the
	PixelArray uses.
Inherited from object	
_class	

7.8 Class Rect

Rect(left, top, width, height) -> Rect Rect((left, top), (width, height)) -> Rect Rect(object) -> Rect pygame object for storing rectangular coordinates

7.8.1 Methods

$_$ coerce $_(x, y)$	
coerce(x, y)	

$$\frac{\text{--delitem}_{--}(x, y)}{\text{del } \mathbf{x}[\mathbf{y}]}$$

```
\frac{\text{\__delslice}_{--}(x, i, j)}{\text{del x[i:j]}}
Use of negative indices is not supported.
```

 $\frac{-\mathbf{eq}_{-}(x, y)}{\mathbf{x} == \mathbf{y}}$

 $\frac{-g\mathbf{e}_{-}(x, y)}{x > = y}$

 $\frac{\text{_-getitem}_{\text{_-}}(x, y)}{x[y]}$

__getslice__(x, i, j) $\mathbf{x}[i:j]$ Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{\mathbf{x} > \mathbf{y}}$

__init__(left, top, width, height)

x.__init__(...) initializes x; see help(type(x)) for signature

Return Value

Rect

Overrides: object.__init__

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

 $\frac{- \operatorname{len}_{-}(x)}{\operatorname{len}(\mathbf{x})}$

 $\frac{-\mathbf{lt}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$

 $\frac{-\mathbf{ne}_{-}(x, y)}{x!=y}$

__new__(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

 $_$ nonzero $_(x)$

x != 0

__reduce__(...)

helper for pickle

Overrides: object._reduce_ extit(inherited documentation)

 $_{-}$ **repr** $_{-}(x)$

repr(x)

Overrides: object._repr_

 $_{-}$ setitem $_{-}(x, i, y)$

x[i]=y

 $_$ setslice $_(x, i, j, y)$

x[i:j]=y

Use of negative indices is not supported.

 $_{-}\mathbf{str}_{-}(x)$

str(x)

Overrides: object._str_

 $\mathbf{clamp}(Rect)$

moves the rectangle inside another

Return Value

Rect

$\mathbf{clamp_ip}(Rect)$

moves the rectangle inside another, in place

Return Value

None

$\mathbf{clip}(Rect)$

crops a rectangle inside another

Return Value

Rect

collidedict(dict)

test if one rectangle in a dictionary intersects

Return Value

(key, value)

collidedictall(dict)

test if all rectangles in a dictionary intersect

Return Value

[(key, value), ...]

collidelist(list)

test if one rectangle in a list intersects

Return Value

index

collidelistall(*list*)

test if all rectangles in a list intersect

Return Value

indices

collidepoint(x, y)

 $\operatorname{collidepoint}((x,y))$ -> bool test if a point is inside a rectangle

Return Value

bool

colliderect(Rect)

test if two rectangles overlap

Return Value

bool

contains(Rect)

test if one rectangle is inside another

Return Value

bool

copy()

copy the rectangle

Return Value

Rect

fit(Rect)

resize and move a rectangle with aspect ratio

Return Value

Rect

inflate(x, y)

grow or shrink the rectangle size

Return Value

Rect

 $inflate_ip(x, y)$

grow or shrink the rectangle size, in place

Return Value

None

move(x, y)

moves the rectangle

Return Value

Rect

 $\mathbf{move_ip}(x, y)$

moves the rectangle, in place

Return Value

None

normalize()

correct negative sizes

Return Value

None

union(Rect)

joins two rectangles into one

Return Value

Rect

 $union_ip(Rect)$

joins two rectangles into one, in place

Return Value

None

unionall(Rect_sequence)

the union of many rectangles

Return Value

Rect

unionall_ip(Rect_sequence)

the union of many rectangles, in place

Return Value

None

Inherited from object

```
\label{eq:condition} $$ \__{-delattr_{-}(), \_format_{-}(), \_getattribute_{-}(), \_hash_{-}(), \_reduce_{-}ex_{-}(), \_setattr_{-}(), \_sizeof_{-}(), \_subclasshook_{-}() }
```

7.8.2 Properties

Name	Description
safe_for_unpickling	

 $continued\ on\ next\ page$

Name	Description
bottom	
bottomleft	
bottomright	
center	
centerx	
centery	
h	
height	
left	
midbottom	
midleft	
midright	
midtop	
right	
size	
top	
topleft	
topright	
W	
width	
X	
У	
Inherited from object	
class	

7.9 Class Surface

object pygame.Surface

Surface((width, height), flags=0, depth=0, masks=None) -> Surface Surface((width, height), flags=0, Surface) -> Surface pygame object for representing images

7.9.1 Methods

copy()
create a new copy of a Surface
Return Value
Surface

__init__(...)

 $x._init_{-}(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

 $_{-}\mathbf{repr}_{-}(x)$

repr(x)

Overrides: object._repr_

blit(source, dest, area=None, special_flags=0)

draw one image onto another

Return Value

Rect

convert(Surface)

convert(depth, flags=0) -> Surface convert(masks, flags=0) -> Surface convert() -> Surface change the pixel format of an image

Return Value

Surface

convert_alpha(Surface)

convert_alpha() -> Surface change the pixel format of an image including per pixel alphas

Return Value

Surface

copy()

create a new copy of a Surface

Return Value

Surface

fill(color, rect=None, special_flags=0)

fill Surface with a solid color

Return Value

Rect

get_abs_offset()

find the absolute position of a child subsurface inside its top level parent

Return Value

(x, y)

get_abs_parent()

find the top level parent of a subsurface

Return Value

Surface

get_alpha()

get the current Surface transparency value

Return Value

int_value or None

$\mathbf{get}_{-}\mathbf{at}(...)$

 $get_at((x, y)) \rightarrow Color get the color value at a single pixel$

$get_at_mapped(...)$

 $get_at_mapped((x, y)) \rightarrow Color get the mapped color value at a single pixel$

get_bitsize()

get the bit depth of the Surface pixel format

Return Value

int

get_bounding_rect(min_alpha=1)

find the smallest rect containing data

Return Value

Rect

get_buffer()

acquires a buffer object for the pixels of the Surface.

Return Value

BufferProxy

get_bytesize()

get the bytes used per Surface pixel

Return Value

int

$\mathbf{get_clip}()$

get the current clipping area of the Surface

Return Value

Rect

get_colorkey()

Get the current transparent colorkey

Return Value

RGB or None

$\mathbf{get_flags}()$

get the additional flags used for the Surface

Return Value

int

$\mathbf{get_height}()$

get the height of the Surface

Return Value

height

$get_locked()$

test if the Surface is current locked

Return Value

bool

get_locks()

Gets the locks for the Surface

Return Value

tuple

get_losses()

the significant bits used to convert between a color and a mapped integer

Return Value

(R, G, B, A)

get_masks()

the bitmasks needed to convert between a color and a mapped integer

Return Value

(R, G, B, A)

get_offset()

find the position of a child subsurface inside a parent

Return Value

(x, y)

get_palette()

get the color index palette for an 8bit Surface

Return Value

[RGB, RGB, RGB, ...]

$get_palette_at(index)$

get the color for a single entry in a palette

Return Value

RGB

get_parent()

find the parent of a subsurface

Return Value

Surface

get_pitch()

get the number of bytes used per Surface row

Return Value

int

get_rect(**kwargs)

get the rectangular area of the Surface

Return Value

Rect

$get_shifts()$

the bit shifts needed to convert between a color and a mapped integer

Return Value

(R, G, B, A)

get_size()

get the dimensions of the Surface

Return Value

(width, height)

get_view(...)

get_view(<kind>='2') -> BufferProxy return a buffer view of the Surface's pixels.

get_width()

get the width of the Surface

Return Value

width

lock()

lock the Surface memory for pixel access

Return Value

None

$\mathbf{map_rgb}(Color)$

convert a color into a mapped color value

Return Value

mapped_int

mustlock()

test if the Surface requires locking

Return Value

bool

scroll(dx=0, dy=0)

Shift the surface image in place

Return Value

None

set_alpha(*value*, *flags*=0)

set_alpha(None) -> None set the alpha value for the full Surface image

Return Value

None

$\mathbf{set}_{-}\mathbf{at}(...)$

 $set_at((x, y), Color) \rightarrow None set the color value for a single pixel$

$set_clip(rect)$

set_clip(None) -> None set the current clipping area of the Surface

Return Value

None

set_colorkey(Color, flags=0)

set_colorkey(None) -> None Set the transparent colorkey

Return Value

None

set_masks(...)

 $\operatorname{set_masks}((r,g,b,a))$ -> None set the bit masks needed to convert between a color and a mapped integer

 $set_palette(RGB=..., RGB=..., RGB=..., ...)$

set the color palette for an 8bit Surface

Return Value

None

$set_palette_at(index, RGB)$

set the color for a single index in an 8bit Surface palette

Return Value

None

set_shifts(...)

 $\operatorname{set_shifts}((r,g,b,a))$ -> None sets the bit shifts needed to convert between a color and a mapped integer

subsurface(Rect)

create a new surface that references its parent

Return Value

Surface

unlock()

unlock the Surface memory from pixel access

Return Value

None

$\mathbf{unmap_rgb}(mapped_int)$

convert a mapped integer color value into a Color

Return Value

Color

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

7.9.2 Properties

Name	Description
Inherited from object	
_class	

7.10 Class Surface



Surface((width, height), flags=0, depth=0, masks=None) -> Surface Surface((width, height), flags=0, Surface) -> Surface pygame object for representing images

7.10.1 Methods

__copy__()

create a new copy of a Surface

Return Value

Surface

__init__(...)

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__

__**new**__(*T*, *S*, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

 $_{-}\mathbf{repr}_{-}(x)$

repr(x)

Overrides: object._repr_

blit(source, dest, area=None, special_flags=0)

draw one image onto another

Return Value

Rect

convert(Surface)

 $\begin{array}{l} convert(depth,\,flags=0) -> Surface \,\, convert(masks,\,flags=0) -> Surface \,\, convert() -> Surface \,\, change \,\, the \,\, pixel \,\, format \,\, of \,\, an \,\, image \end{array}$

Return Value

Surface

$\mathbf{convert_alpha}(\mathit{Surface})$

convert_alpha() -> Surface change the pixel format of an image including per pixel alphas

Return Value

Surface

copy()

create a new copy of a Surface

Return Value

Surface

fill(color, rect=None, special_flags=0)

fill Surface with a solid color

Return Value

Rect

get_abs_offset()

find the absolute position of a child subsurface inside its top level parent

Return Value

(x, y)

get_abs_parent()

find the top level parent of a subsurface

Return Value

Surface

get_alpha()

get the current Surface transparency value

Return Value

int_value or None

$\mathbf{get}_{-}\mathbf{at}(...)$

 $get_at((x, y)) \rightarrow Color get the color value at a single pixel$

$get_at_mapped(...)$

 $get_at_mapped((x, y)) \rightarrow Color get the mapped color value at a single pixel$

get_bitsize()

get the bit depth of the Surface pixel format

Return Value

int

get_bounding_rect(min_alpha=1)

find the smallest rect containing data

Return Value

Rect

get_buffer()

acquires a buffer object for the pixels of the Surface.

Return Value

BufferProxy

get_bytesize()

get the bytes used per Surface pixel

Return Value

int

get_clip()

get the current clipping area of the Surface

Return Value

Rect

get_colorkey()

Get the current transparent colorkey

Return Value

RGB or None

get_flags()

get the additional flags used for the Surface

Return Value

int

get_height()

get the height of the Surface

Return Value

height

$\mathbf{get_locked}()$

test if the Surface is current locked

Return Value

bool

get_locks()

Gets the locks for the Surface

Return Value

tuple

get_losses()

the significant bits used to convert between a color and a mapped integer

Return Value

(R, G, B, A)

$\mathbf{get_masks}()$

the bitmasks needed to convert between a color and a mapped integer

Return Value

(R, G, B, A)

get_offset()

find the position of a child subsurface inside a parent

Return Value

(x, y)

get_palette()

get the color index palette for an 8bit Surface

Return Value

[RGB, RGB, RGB, ...]

$get_palette_at(index)$

get the color for a single entry in a palette

Return Value

RGB

get_parent()

find the parent of a subsurface

Return Value

Surface

$\mathbf{get_-pitch}()$

get the number of bytes used per Surface row

Return Value

int

get_rect(**kwargs)

get the rectangular area of the Surface

Return Value

Rect

get_shifts()

the bit shifts needed to convert between a color and a mapped integer

Return Value

(R, G, B, A)

get_size()

get the dimensions of the Surface

Return Value

(width, height)

 $\mathbf{get_-view}(...)$

get_view(<kind>='2') -> BufferProxy return a buffer view of the Surface's pixels.

get_width()

get the width of the Surface

Return Value

width

lock()

lock the Surface memory for pixel access

Return Value

None

 $\mathbf{map_rgb}(\mathit{Color})$

convert a color into a mapped color value

Return Value

mapped_int

mustlock()

test if the Surface requires locking

Return Value

bool

scroll(dx=0, dy=0)

Shift the surface image in place

Return Value

None

set_alpha(*value*, *flags*=0)

set_alpha(None) -> None set the alpha value for the full Surface image

Return Value

None

 $\mathbf{set}_{-}\mathbf{at}(...)$

 $set_at((x, y), Color) \rightarrow None set the color value for a single pixel$

$\mathbf{set_clip}(rect)$

set_clip(None) -> None set the current clipping area of the Surface

Return Value

None

set_colorkey(Color, flags=0)

set_colorkey(None) -> None Set the transparent colorkey

Return Value

None

set_masks(...)

 $set_masks((r,g,b,a))$ -> None set the bitmasks needed to convert between a color and a mapped integer

$set_palette(RGB=..., RGB=..., RGB=..., ...)$

set the color palette for an 8bit Surface

Return Value

None

$set_palette_at(index, RGB)$

set the color for a single index in an 8bit Surface palette

Return Value

None

set_shifts(...)

 $set_shifts((r,g,b,a))$ -> None sets the bit shifts needed to convert between a color and a mapped integer

subsurface(Rect)

create a new surface that references its parent

Return Value

Surface

unlock()

unlock the Surface memory from pixel access

Return Value

None

Class error Package pygame

```
unmap_rgb(mapped_int)
convert a mapped integer color value into a Color
Return Value
Color
```

Inherited from object

```
\label{lem:condition} $$\_\_delattr_{-}(), \_\_format_{-}(), \_\_getattribute_{-}(), \_\_hash_{-}(), \_\_reduce_{-}(), \_\_reduce_{-}(), \_\_str_{-}(), \_\_subclasshook_{-}()
```

7.10.2 Properties

Name	Description
Inherited from object	
_class	

7.11 Class error

```
object —
exceptions.BaseException —
exceptions.Exception —
exceptions.StandardError —
exceptions.RuntimeError —
pygame.error
```

7.11.1 Methods

$Inherited\ from\ exceptions. Runtime Error$

$Inherited\ from\ exceptions. Base Exception$

```
__delattr__(), __getattribute__(), __getitem__(), __getslice__(), __reduce__(), __repr__(), __setattr__(), __setstate__(), __str__(), __unicode__()
```

Inherited from object

Class error Package pygame

 $_format_(), \ _hash_(), \ _reduce_ex_(), \ _sizeof_(), \ _subclasshook_()$

7.11.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

8 Package pygame-asteroids

8.1 Modules

```
• asteroid (Section ??, p. ??)
```

- asteroid' (Section 9, p. 92)
- bullet (Section ??, p. ??)
- bullet' (Section 10, p. 97)
- color (Section 11, p. 100)
- credit (Section ??, p. ??)
- credit' (Section 12, p. 102)
- file (Section ??, p. ??)
- file': Manipula Arquivo. (Section 13, p. 103)
- font (Section ??, p. ??)
- font' (Section 14, p. 105)
- game (Section ??, p. ??)
- game' (Section 15, p. 106)
- main (Section 16, p. 129)
- menu_helper (Section 17, p. 130)
- polygon (Section ??, p. ??)
- polygon' (Section 18, p. 134)
- resource_manager (Section ??, p. ??)
- resource_manager' (Section 19, p. 138)
- score (Section 20, p. 142)
- ship (Section 21, p. 143)
- sprite_collision (Section 22, p. 146)
- start_field (Section 23, p. 148)
- state_machine (Section ??, p. ??)
- state_machine': Generalização de uma máquina de estado. (Section 24, p. 150)
- states (Section ??, p. ??)
 - franchise (Section ??, p. ??)
 - intro (Section ??, p. ??)
 - menu: The splash screen of the game. (Section 27, p. 165)
 - seal (Section ??, p. ??)
- Scar (Section ..., p. ...)
- states' (Section 29, p. 175)
 - franchise': Tela como selo de classificação do jogo.
 - (Section 25, p. 152)
 - intro': Tela inicial do jogo.
 - (Section 26, p. 161)
 - seal': Tela como selo de classificação do jogo.
 (Section 28, p. 167)

- test_audio (Section ??, p. ??)
- test_audio' (Section 30, p. 176)
- test_rotation (Section ??, p. ??)
- test_rotation' (Section 31, p. 202)
- test_startfield (Section ??, p. ??)
- test_startfield' (Section 32, p. 228)
- test_touch_buttons (Section ??, p. ??)
- test_touch_buttons' (Section 33, p. 230)
- test_virtual_keyboard (Section ??, p. ??)
- test_virtual_keyboard' (Section 34, p. 253)
- tools (Section ??, p. ??)
- tools': This module contains the fundamental Control class. (Section 35, p. 254)
- touch_buttons (Section 36, p. 260)
- virtual_controller (Section 37, p. 261)
- virtual_keyboard (Section 38, p. 262)

8.2 Variables

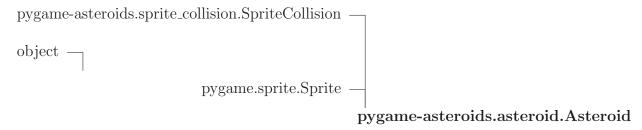
Name	Description
package	Value: None

9 Module pygame-asteroids.asteroid'

9.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

9.2 Class Asteroid



Representa o asteroid

9.2.1 Methods

__init__(self, location, size, angle, game_controller, from_color=(255, 0, 255, 255), to_color=(255, 0, 0, 255), *groups)

Construtor
Overrides: object.__init__

destroy(self, angle)
Destruir asteroids
Parameters
angle: Ângulo

random_angle(self)
Retorna angulo aleatória

rotate(self, size)

update(*self*, *time*)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

9.2.2 Properties

Name	Description
Inherited from object	
class	

9.2.3 Class Variables

Name	Description
SECTIONS	Value: 2
SPEED	Value: 0.5

9.3 Class Color

Representa cor

9.3.1 Methods

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

random_color()

Retorna cor aleatória

Return Value

Cor(r,g,b)

color_replace(surface, find_color, replace_color)

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

9.3.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)

continued on next page

Name	Description
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

9.4 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

9.4.1 Methods

$initrect(self, location, game_controller)$
Iniciliza retângulo
Parameters
location:
game_controller:

$get_class_name(self)$
Retorna nome da classe instanciada
Return Value
Nome

screencollision(self, time)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

10 Module pygame-asteroids.bullet'

10.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

10.2 Class Bullet

```
pygame-asteroids.sprite_collision.SpriteCollision — object — pygame.sprite.Sprite — pygame-asteroids.bullet.Bullet
```

Bala

10.2.1 Methods

init(self, location, angle, game_controller, *groups)
Construtor
Parameters
location:
angle:
game_controller:
groups:
Return Value Instância
Overrides: objectinit

$\mathbf{destroy}(self)$	
Destruir	

update(self, time)

Atualizar

Parameters

time: Delta time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

```
__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

10.2.2 Properties

Name	Description
Inherited from object	
class	

10.3 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

10.3.1 Methods

 $\frac{\mathbf{initrect}(\mathit{self}, \mathit{location}, \mathit{game_controller})}{\mathbf{Iniciliza\ ret\^{a}ngulo}}$

Parameters

location:

game_controller:

 $get_class_name(self)$

Retorna nome da classe instanciada

Return Value

Nome

screencollision(self, time)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

11 Module pygame-asteroids.color

11.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

11.2 Class Color

Representa cor

11.2.1 Methods

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

 ${\bf random_color}()$

Retorna cor aleatória

Return Value

Cor(r,g,b)

 $\mathbf{color_replace}(\mathit{surface}, \mathit{find_color}, \mathit{replace_color})$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar
replace_color: Cor a substituir

Return Value

Image Modificada

11.2.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

12 Module pygame-asteroids.credit'

12.1 Functions

credit(text, font, color, fps=40, callback=None)

Créditos rolando verticalmente

Parameters

text: Texto
font: Fonte
color: Cor

credit_from_file(file_name, font, color, fps=40, callback=None)

decode_joystick_arrow_to_keyboard_key(joystick)

is_event_type_an_input_down(event)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

12.2 Variables

Name	Description
package	Value: 'pygame-asteroids'

13 Module pygame-asteroids.file'

Manipula Arquivo.

Version: 1.0

Author: Humberto Lino

13.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

13.2 Class DataHandler

13.2.1 Methods

```
\mathbf{defaultscore}(\mathit{self})
```

13.3 Class FileManager

13.3.1 Methods

```
|\mathbf{get\_pickle\_fixed\_protocol}(self)|
```

```
load(self, file\_name, file\_format = \{ 'asteroide': -1, 'controle': 1, 'janela': 2, 'mostrar_mo..., sep=' ')
```

Carregar arquivo

Parameters

file_name: Nome do arquivo
file_format: Formato do arquivo

sep: Separador

Return Value

Mapa preenchido

marshal(self, file_name, object)

unmarshal(self, file_name)

unmarshal_marshal(self, file_name, default_object)

13.3.2 Class Variables

Name	Description
CHARSET	Value: 'utf-8'

14 Module pygame-asteroids.font'

14.1 Variables

Name	Description
package	Value: None

14.2 Class Font

14.2.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

15 Module pygame-asteroids.game'

15.1 Functions

 $\mathbf{decode_joystick_arrow_to_keyboard_key}(joystick)$

getpagesize(...)

 $\mathbf{getrlimit}(...)$

getrusage(...)

is_event_type_an_input_down(event)

setrlimit(...)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

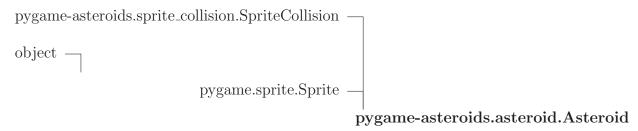
15.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7

continued on next page

Name	Description
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'
warningregistry	Value: {('Not importing directory
	\','Users/tux/git/pygame-astero

15.3 Class Asteroid



Representa o asteroid

15.3.1 Methods

```
__init__(self, location, size, angle, game_controller, from_color=(255, 0, 255), to_color=(255, 0, 0, 255), *groups)

Construtor

Overrides: object.__init__
```

destroy(self, angle)	
Destruir asteroids	
Parameters	
angle: Ângulo	

$random_angle(\mathit{self})$
Retorna angulo aleatória

```
\mathbf{rotate}(self)
```

scale(self, size)

update(self, time)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

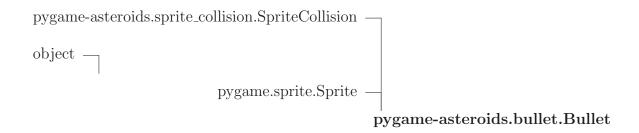
15.3.2 Properties

Name	Description
Inherited from object	
class	

15.3.3 Class Variables

Name	Description
SECTIONS	Value: 2
SPEED	Value: 0.5

15.4 Class Bullet



Bala

15.4.1 Methods

```
__init__(self, location, angle, game_controller, *groups)

Construtor

Parameters
    location:
    angle:
    game_controller:
    groups:

Return Value
    Instância

Overrides: object.__init__
```

```
\frac{\mathbf{destroy}(\mathit{self})}{\mathbf{Destruir}}
```

```
update(self, time)

Atualizar

Parameters
    time: Delta time

Overrides: pygame.sprite.Sprite.update
```

```
Inherited\ from\ pygame-asteroids.sprite\_collision.SpriteCollision(Section\ 33.12)
```

```
collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()
```

$Inherited\ from\ pygame.sprite. Sprite$

```
__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

15.4.2 Properties

Name	Description
Inherited from object	
class	

15.5 Class Color

Representa cor

15.5.1 Methods

 $\mathbf{hex_to_rgb}(\mathit{value})$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

random_color()

Retorna cor aleatória

Return Value

Cor(r,g,b)

 ${\bf color_replace}(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

15.5.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

15.6 Class DataHandler

15.6.1 Methods

 $\mathbf{defaultscore}(\mathit{self})$

15.7 Class FileManager

15.7.1 Methods

get_pickle_fixed_protocol(self)

 $load(self, file_name, file_format = \{ 'asteroide': -1, 'controle': 1, 'janela': 2, 'mostrar_mo..., sep=' ')$

Carregar arquivo

Parameters

file_name: Nome do arquivo

file_format: Formato do arquivo

sep: Separador

Return Value

Mapa preenchido

marshal(self, file_name, object)

unmarshal(self, file_name)

unmarshal_marshal(self, file_name, default_object)

15.7.2 Class Variables

Name	Description
CHARSET	Value: 'utf-8'

15.8 Class Font

15.8.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

15.9 Class Game

15.9.1 Methods

```
\_\_init\_\_(self, map)
```

create_empty_actions()

15.10 Class GameController

object —

pygame-asteroids.game.GameController

Controlador do Jogo

15.10.1 Methods

 $_$ init $_$ (self, game_name, screen, file_manager, asset_manager, config, score_data)

Construtor

Parameters

screen:

file_manager:

asset_manager:

config:

score_data:

Overrides: object.__init__

announcelevel(self, time, screen)

Mostrar na tela o nível

Parameters

time: Delta time

screen: Tela

 $create_asteroids(self)$

Criar asteroids

 $create_random_asteroids(self, count)$

Cria asteroids aleatoriamente

Parameters

self:

Return Value

asteroids

draw_game_over(self, screen, event, time)

Desenhar fim de jogo

Parameters

screen: Tela

event: Evento

time: Delta Time

draw_hud(self, screen, time)

Desenha head-up display

Parameters

screen: Tela

get_display_center(self)

get_user_score_on_ranking(self)

initialize_joystick(self)

main(self, screen)

quit(self)

 $random_position(self)$

save_score(self, user_name)

 $screen_rect(self)$

Retangulo com o tamanho da tela

Return Value

Retangulo

$show_fps(self)$

Display the current FPS in the window handle if fps_visible is True.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

15.10.2 Properties

Name	Description
Inherited from object	
_class	

15.10.3 Class Variables

Name	Description
newhiscore	Value: 0
running	Value: 0

15.11 Class Ship



Nave

15.11.1 Methods

__init__(self, location, game_controller, *groups) Construtor **Parameters** location: game_controller: groups: Return Value Instância Overrides: object.__init__ accelerate(self, angle) $accelerate_speed(self, angle, x, y)$ Acelerar Parameters angle: Ângulo Posição X x:Posição Y у: $\mathbf{shoot}(\mathit{self})$ Atirar get_center(self) **explode**(*self*, *time*) Explidir nave **Parameters** time: Delta Time **left**(self, time) **right**(self, time) $\mathbf{up}(self)$

rotate(self, angle)

update(self, time)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

$Inherited\ from\ object$

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

15.11.2 Properties

Name	Description
Inherited from object	
class	

15.11.3 Class Variables

Name	Description
SPEED_ACCELERATE	Velociadade de aceleração
	Value: 0.025
SPEED_ROTATE	Velocidade de rotação
	Value: 0.4
TIME_LOAD	Tempo para carregar
	Value: 200.0
TIME_RELOAD_SHOT	Tempo para recarregar
	Value: 100

15.12 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

15.12.1 Methods

initrect(self, location, game_controller)

Iniciliza retângulo

Parameters

location:

game_controller:

get_class_name(self)

Retorna nome da classe instanciada

Return Value

Nome

screencollision(self, time)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

```
collision(self, object)

Detecta colisão

Parameters
object: Objeto

Return Value
Booleano
```

15.13 Class SpriteGroup

```
object —

pygame.sprite.AbstractGroup —

pygame.sprite.Group —

pygame-asteroids.game.SpriteGroup
```

Agrupado de Sprites

15.13.1 Methods

```
draw2(self, screen)

Desenhar na tela

Parameters

screen: Tela
```

Inherited from pygame.sprite.Group

```
__init__()
```

Inherited from pygame.sprite.AbstractGroup

```
_contains_(), _iter_(), _len_(), _nonzero_(), _repr_(), add(), add_internal(), clear(), copy(), draw(), empty(), has(), has_internal(), remove(), remove_internal(), sprites(), update()
```

Inherited from object

15.13.2 Properties

Name	Description
Inherited from object	
_class	

15.14 Class StarField

object —

 $pygame-asteroids.start_field.StarField$

15.14.1 Methods

 $_$ **init** $_$ (self, screen)

Create the starfield

Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

 $|\mathbf{draw}(self)|$

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

15.14.2 Properties

Name	Description
Inherited from object	
class	

15.14.3 Class Variables

Name	Description
NUM_STARS	Value: 30

continued on next page

Name	Description
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

15.15 Class TextInput

object —

pygame-asteroids.virtual_keyboard.TextInput

Handles the text input box and manages the cursor

15.15.1 Methods

__init__(self, background, screen, font, text, x, y)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self)
Draw the text input box

 $\frac{\text{flashcursor}(self)}{\text{Toggle visibility of the cursor}}$

Add a character whereever the cursor is currently located

 $\frac{\mathbf{backspace}(\mathit{self})}{\mathbf{Delete} \ \mathbf{a} \ \mathbf{character} \ \mathbf{before} \ \mathbf{the} \ \mathbf{cursor} \ \mathbf{position}}$

 $\frac{\mathbf{deccursor}(self)}{\mathbf{Move the cursor one space left}}$

inccursor(self)

Move the cursor one space right (but not beyond the end of the text)

drawcursor(self)

Draw the cursor

Inherited from object

15.15.2 Properties

Name	Description
Inherited from object	
class	

15.16 Class TouchButtons

15.16.1 Methods

__init__(self, screen, button_width=40)

create_touch_buttons(self, button_width)

draw(self)

detect_actions(self, event, actions)

15.17 Class VirtualKey

object —

 $pygame-asteroids.virtual_keyboard.VirtualKey$

A single key for the VirtualKeyboard

15.17.1 Methods

 $_init_(self, caption, x, y, w=67, h=67)$

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self, screen, background, shifted = False, forcedraw = False)

Draw one key if it needs redrawing

Inherited from object

15.17.2 Properties

Name	Description
Inherited from object	
class	

15.18 Class VirtualKeyboard

object —

$pygame-asteroids.virtual_keyboard.VirtualKeyboard\\$

Implement a basic full screen virtual keyboard for touchscreens

15.18.1 Methods

run(self, screen, font, text='', callback=None)

not_null(self, text)

unselectall(self, force=False)

Force all the keys to be unselected Marks any that change as dirty to redraw

clickatmouse(self)

Check to see if the user is pressing down on a key and draw it selected

$\mathbf{togglecaps}(self)$

Toggle uppercase / lowercase

selectatmouse(self)

User has clicked a key, let's use it

addkeys(self)

Adds the setup for the keys. This would be easy to modify for additional keys

The default start position places the keyboard slightly left of center by design so many people have issues with the right side of their touchscreens that I did this on purpose.

paintkeys(self)

Draw the keyboard (but only if they're dirty.)

clear(self)

Put the screen back to before we started

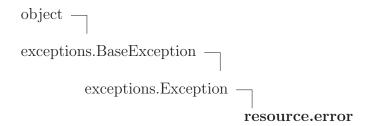
Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

15.18.2 Properties

Name	Description
Inherited from object	
class	

15.19 Class error



15.19.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

15.19.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

15.20 Class struct_rusage

object — resource.struct_rusage
struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of (utime, stime, maxrss, ixrss, idrss, isrss, minflt, majflt,

nswap,inblock,oublock,msgsnd,msgrcv,nsignals,nvcsw,nivcsw)
or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

15.20.1 Methods

$_$ add $_$ (x, y)	
x+y	

 $\frac{\text{_-contains}_{-}(x, y)}{\text{y in x}}$

 $\frac{-\operatorname{eq}_{--}(x, y)}{x = = y}$

 $\frac{\mathbf{ge}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\frac{\text{_-getitem}_{\text{--}}(x, y)}{\mathbf{x}[\mathbf{y}]}$

 $__\mathbf{getslice}__(x,\ i,\ j)$

x[i:j]

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{\mathbf{x} > \mathbf{y}}$

 $\frac{-\text{hash}_{-}(x)}{\text{hash}(x)}$ Overrides: object.__hash__

 $\boxed{\frac{-\mathbf{le}_{--}(x, y)}{\mathbf{x} <= \mathbf{y}}}$

$\phantom{aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa$	
len(x)	

$$\frac{-\mathbf{l}\mathbf{t}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$$

$$\frac{-\mathbf{mul}_{-}(x, n)}{\mathbf{x}^*\mathbf{n}}$$

$$\frac{-\mathbf{ne}_{--}(x, y)}{\mathbf{x}! = \mathbf{y}}$$

__new__(*T*, *S*, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
\frac{-\mathbf{repr}_{--}(x)}{\operatorname{repr}(x)}
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
\label{lem:condition} $$ \__delattr_{-}(), \__format_{-}(), \__getattribute_{-}(), \__init_{-}(), \__reduce\_ex_{-}(), \__setattr_{-}(), \__sizeof_{-}(), \__str_{-}(), \__subclasshook_{-}() $
```

15.20.2 Properties

Name	Description	
ru_idrss	unshared data size	
ru_inblock	block input operations	

 $continued\ on\ next\ page$

Name	Description
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
_class	

15.20.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
n_unnamed_fields	Value: 0

16 Module pygame-asteroids.main

Version: 1.0

Author: Humberto Lino

16.1 Functions

main()	
Método principal, que inicializa o jogo	

17 Module pygame-asteroids.menu_helper

17.1 Class MenuItem

```
\begin{array}{ccc} \textbf{pygame.font.Font} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ &
```

Item de Menu

17.1.1 Methods

```
__init__(self, text, padding_y=0, font_path=None, font_size=Font.SMALL,
font_color=Color.WHITE, pos_x_pos_y=(0,0))

Construtor

Parameters
    text:
    padding_y:
    font_path:
    font_size:
    font_color:
    pos_x_pos_y:

Return Value
    Instância
```

```
is_mouse_selection(self, posx_posy)
Seleção feita pelo mouse?
Parameters
    posx_posy: Posição a verificar
Return Value
    boolean
```

```
set\_position(self, x, y)
```

```
set\_font\_color(self, rgb\_tuple)
```

```
\mathbf{get\_font\_color}(self)
```

17.2 Class Menu

Menu

17.2.1 Methods

```
_init__(self, game_controller, items, funcs, padding_y=0, padding_item_y=0,
bg_color=Color.BLACK, select_color=Color.GREEN, font_path=None,
font_size=Font.SMALL, font_color=Color.WHITE)
Construtor
Parameters
    game_controller:
    items:
    funcs:
    padding_y:
    padding_item_y:
    bg_color:
    select_color:
    font_path:
    font_size:
    font_color:
Return Value
    Instância
```

```
\mathbf{back}(\mathit{self})
```

```
| set_mouse_visibility(self)
```

```
set_keyboard_selection(self, key)

Marks the MenuItem chosen via up and down keys.
```

```
set_mouse_selection(self, item, mpos)

Marks the MenuItem the mouse cursor hovers on.
```

```
\mathbf{play\_hover\_sound}(\mathit{self})
```

play_enter_sound(self)

draw(self, draw_callback_func=None)

Desenhar

Parameters

draw_callback_func:

 $run(self, fps, draw_callback_func = None)$

17.3 Class MainMenu

Menu Principal

17.3.1 Methods

 $_$ init $_$ ($self, game_controller, call_back_function = None$)

Construtor

Parameters

game_controller:

call_back_function:

Return Value

Instância

 $\mathbf{run}(self)$

create_main_menu(self)

Cria menu principal

play(self)

Jogar

high_score(self, position_to_hightlight=None)

Placar

how_to_play(self)

Como Jogar

$\mathbf{credits}(self)$	
Créditos	

18 Module pygame-asteroids.polygon'

18.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

18.2 Class Color

Representa cor

18.2.1 Methods

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value

Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

 ${\bf random_color}()$

Retorna cor aleatória

Return Value

Cor(r,g,b)

 $color_replace(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

18.2.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

18.3 Class Cube

18.3.1 Methods

init (colf)		
IIII		

draw(self, screen)

18.4 Class Point3D

18.4.1 Methods

 $_init_(self, x=0, y=0, z=0)$

project(self, win_width, win_height, fov, viewer_distance)

Transforms this 3D point to 2D using a perspective projection.

rotateX(self, angle)

Rotates the point around the X axis by the given angle in degrees.

rotateY(self, angle)

Rotates the point around the Y axis by the given angle in degrees.

rotate**Z**(self, angle)

Rotates the point around the Z axis by the given angle in degrees.

18.5 Class itemgetter

object — operator.itemgetter

itemgetter(item, ...) -> itemgetter object

Return a callable object that fetches the given item(s) from its operand. After f = itemgetter(2), the call f(r) returns r[2]. After g = itemgetter(2, 5, 3), the call g(r) returns (r[2], r[5], r[3])

18.5.1 Methods

 $\frac{-\text{call}_{-}(x, \dots)}{x(\dots)}$

 $_$ getattribute $_$ (...)

 $x._getattribute_{-}('name') \le x.name$

Overrides: object.__getattribute__

Inherited from object

```
\label{eq:condition} $$ $\_\_delattr_{-}(), \_\_format_{-}(), \_\_hash_{-}(), \_\_init_{-}(), \_\_reduce_{-}(), \_\_reduce_{-}ex_{-}(), \_\_repr_{-}(), \_\_setattr_{-}(), \_\_sizeof_{-}(), \_\_str_{-}(), \_\_subclasshook_{-}() $
```

18.5.2 Properties

Name	Description
Inherited from object	
_class	

19 Module pygame-asteroids.resource_manager'

19.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

19.2 Class Font

19.2.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

19.3 Class ResourceManager

Gerenciador de Recursos

19.3.1 Methods

__init__(self, dir_root=None)

Construtor

Parameters
 dir_root: Diretório raiz

Return Value Instância

get_font(self, size=30)

Obtém Fonte padrão

Parameters

size: Tamanho

Return Value

Fonte

get_font_by_name(self, name, size)

Obtém Fonte pelo nome

Parameters

name: Nome

size: Tamanho

Return Value

Fonte

$\mathbf{get_font_default_name}(\mathit{self})$

Obtém Fonte padrão

Return Value

Fonte

get_font_large(self, name)

Obtém Fonte Grande

Parameters

name: Nome

Return Value

Fonte

get_font_normal(self, name)

Obtém Fonte Normal

Parameters

name: Nome

Return Value

Fonte

get_font_path(self, name)

Obtém caminho da fonte

Parameters

name: Nome

Return Value

Fonte

get_font_small(self, name)

Obtém Fonte pequena

Parameters

name: Nome

Return Value

Fonte

get_font_very_small(self, name)

Obtém Fonte muito pequena

Parameters

name: Nome

Return Value

Fonte

get_image(self, name)

Obtém imagem

Parameters

name: Nome

Return Value

Imagem

get_scalled_image(self, name, scale)

 $init_mixer(self)$

Inicia mixer

list_files(self, dir)

load(self, dir_root)

Carregar

Parameters

dir_root: Diretório raiz

 $load_font(self)$

Carregar fontes

load_im	$\mathbf{age}(self)$
---------	----------------------

Carregar imagens

load_music(self)

Carregar efeitos sonoros

$load_sound(self)$

Carregar efeitos sonoros

play_music(self, name, loops=1)

Reproduz música

Parameters

name: Nome

loops: Quantas vezes repetir

play_sound(self, name, loops=1)

Reproduzir efeito sonoro

Parameters

name: Nome

loops: Repetição

19.3.2 Class Variables

Name	Description
fonts	Value: {}
images	Value: {}
musics	Value: {}
sounds	Value: {}

$20 \quad {\rm Module\ pygame-asteroids.score}$

20.1 Variables

Name	Description
package	Value: None

20.2 Class DataHandler

20.2.1 Methods

 $\boxed{\mathbf{defaultscore}(\mathit{self})}$

21 Module pygame-asteroids.ship

21.1 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'

21.2 Class Ship



Nave

21.2.1 Methods

```
__init__(self, location, game_controller, *groups)
Construtor
Parameters
     location:
     game_controller:
     groups:
Return Value
     Instância
Overrides: object.__init__
accelerate(self, angle)
accelerate\_speed(self, angle, x, y)
Acelerar
Parameters
     angle: Ângulo
             Posição X
     x:
             Posição Y
     у:
\mathbf{shoot}(\mathit{self})
Atirar
get_center(self)
explode(self, time)
Explidir nave
Parameters
     time: Delta Time
left(self, time)
right(self, time)
\mathbf{up}(self)
```

rotate(self, angle)

update(*self*, *time*)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

21.2.2 Properties

Name	Description
Inherited from object	
class	

21.2.3 Class Variables

Name	Description
SPEED_ACCELERATE	Velociadade de aceleração
	Value: 0.025
SPEED_ROTATE	Velocidade de rotação
	Value: 0.4
TIME_LOAD	Tempo para carregar
	Value: 200.0
TIME_RELOAD_SHOT	Tempo para recarregar
	Value: 100

22 Module pygame-asteroids.sprite_collision

22.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

22.2 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

22.2.1 Methods

initrect(self, location, game_controller)

Iniciliza retângulo

Parameters

location:

game_controller:

get_class_name(self)

Retorna nome da classe instanciada

Return Value

Nome

screencollision(self, time)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

23 Module pygame-asteroids.start_field

23.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

23.2 Class StarField

object — pygame-asteroids.start_field.StarField

23.2.1 Methods

__init__(self, screen)
Create the starfield
Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

 $\mathbf{draw}(self)$

$Inherited\ from\ object$

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

23.2.2 Properties

Name	Description
Inherited from object	
class	

23.2.3 Class Variables

Name	Description
NUM_STARS	Value: 30
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

24 Module pygame-asteroids.state_machine'

Generalização de uma máquina de estado. Utilizada para gerenciar o fluxo do programa

24.1 Variables

Name	Description
_package	Value: None

24.2 Class StateMachine

object —

 $pygame-asteroids.state_machine.StateMachine\\$

Construtor.

24.2.1 Methods

 $__\mathbf{init}__(self)$

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object._init_ extit(inherited documentation)

draw(self, surface, interpolate)

flip_state(self)

When a State changes to done necessary startup and cleanup functions are called and the current State is changed.

 $get_event(\mathit{self}, \mathit{event})$

Pass events down to current State.

setup_states(self, state_dict, start_state)

Given a dictionary of states and a state to start in, creates the self.state_dict.

update(self, keys, now)

Checks if a state is done or has called for a game quit. State is flipped if neccessary and State.update is called.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

24.2.2 Properties

Name	Description
Inherited from object	
class	

25 Module pygame-asteroids.states.franchise'

Tela como selo de classificação do jogo. Segunda coisa que o jogador visualiza.

25.1 Functions

 $decode_joystick_arrow_to_keyboard_key(joystick)$

getpagesize(...)

getrlimit(...)

getrusage(...)

is_event_type_an_input_down(event)

setrlimit(...)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

25.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1

continued on next page

Name	Description
RLIMIT_MEMLOCK	Value: 6
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids.states'

25.3 Class Color

Representa cor

25.3.1 Methods

 ${\bf color_replace}(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

random_color()

Retorna cor aleatória

Return Value

Cor(r,g,b)

 $\mathbf{rgb_to_hex}(\mathit{rgb})$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

25.3.2 Class Variables

Name	Description
BLACK	Value: (0, 0, 0)
BLUE	Value: (68, 204, 230)
GRAY	Value: (228, 228, 228)
GREEN	Value: (0, 255, 0)
PINK	Value: (255, 0, 255, 255)
RED	Value: (255, 0, 0)
TRANSPARENT	Value: (255, 255, 255, 0)
WHITE	Value: (255, 255, 255)
YELLOW	Value: (255, 255, 0)

25.4 Class Cube

25.4.1 Methods

$__init__(self)$	
----------------------	--

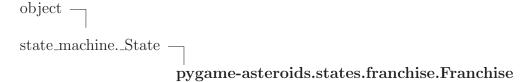
draw(self, screen)

25.5 Class Font

25.5.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

25.6 Class Franchise



This State is updated while our game shows the splash screen.

25.6.1 Methods

```
__init__(self, game_controller)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)
```

 $|\mathbf{draw}(self, surface, interpolate)|$

get_event(self, event)

Get events from Control. Changes to next state on any key press.

Overrides: state_machine._State.get_event

```
update(self, keys, now)
```

Updates the splash screen.

Overrides: state_machine._State.update

$Inherited\ from\ state_machine._State$

```
cleanup(), startup()
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

25.6.2 Properties

Name	Description
Inherited from object	
class	

25.7 Class Point3D

25.7.1 Methods

$$_init_(self, x=0, y=0, z=0)$$

project(self, win_width, win_height, fov, viewer_distance)

Transforms this 3D point to 2D using a perspective projection.

rotateX(self, angle)

Rotates the point around the X axis by the given angle in degrees.

rotateY(self, angle)

Rotates the point around the Y axis by the given angle in degrees.

rotate**Z**(self, angle)

Rotates the point around the Z axis by the given angle in degrees.

25.8 Class error

25.8.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

```
__delattr__(), __getattribute__(), __getitem__(), __getslice__(), __reduce__(), __repr__(), __setattr__(), __setstate__(), __str__(), __unicode__()
```

Inherited from object

25.8.2 Properties

Name	Description
Inherited from exceptions. Be	iseException
args, message	
Inherited from object	
class	

25.9 Class itemgetter

itemgetter(item, ...) -> itemgetter object

Return a callable object that fetches the given item(s) from its operand. After f = itemgetter(2), the call f(r) returns r[2]. After g = itemgetter(2, 5, 3), the call g(r) returns (r[2], r[5], r[3])

25.9.1 Methods

$$\frac{-\operatorname{call}_{-}(x, \ldots)}{\mathrm{x}(\ldots)}$$

```
-_new__(T, S, ...)

Return Value
    a new object with type S, a subtype of T

Overrides: object.__new__
```

Inherited from object

```
__delattr__(), __format__(), __hash__(), __init__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

25.9.2 Properties

Name	Description
Inherited from object	
_class	

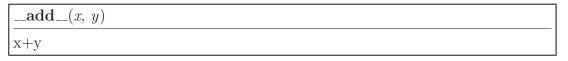
25.10 Class struct_rusage

object — resource.struct_rusage

struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of (utime, stime, maxrss, ixrss, idrss, isrss, minflt, majflt, nswap, inblock, oublock, msgsnd, msgrcv, nsignals, nvcsw, nivcsw) or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

25.10.1 Methods



 $\frac{\text{_-contains}_{--}(x, y)}{\text{y in x}}$

$$\frac{-\operatorname{eq}_{--}(x, y)}{x = = y}$$

$$\frac{-g\mathbf{e}_{-}(x, y)}{\mathbf{x} > = \mathbf{y}}$$

 $\frac{\text{_-getitem}_{--}(x, y)}{x[y]}$

 $_$ getslice $_(x, i, j)$

x[i:j]

Use of negative indices is not supported.

 $-gt_{-}(x, y)$

x>y

-**hash**-(x)

hash(x)

Overrides: object._hash__

 $-le_{-}(x, y)$

x < =y

 $_{-}$ len $_{-}(x)$

len(x)

 $-1t_{-}(x, y)$

x < y

 $_{-}$ **mul** $_{--}(x, n)$

 x^*n

 $_{-}$ **ne** $_{-}(x, y)$

x!=y

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
\frac{\_\_\mathbf{repr}_\_(x)}{\mathrm{repr}(\mathbf{x})} Overrides: object.\_repr\_
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
\label{eq:condition} $$ $\operatorname{log}_{-\infty}(), \operatorname{log}_{-\infty}(), \operatorname{log}_{-
```

25.10.2 Properties

Name	Description
ru_idrss	unshared data size
ru_inblock	block input operations
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
_class	

25.10.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
n_unnamed_fields	Value: 0

26 Module pygame-asteroids.states.intro'

Tela inicial do jogo. Primeira coisa que o jogador visualiza.

26.1 Functions

decode_joystick_arrow_to_keyboard_key(joystick)

 $is_event_type_an_input_down(\mathit{event})$

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y: 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

26.2 Variables

Name	Description
package	Value: 'pygame-asteroids.states'

26.3 Class Color

Representa cor

26.3.1 Methods

color_replace(surface, find_color, replace_color)

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $random_color()$

Retorna cor aleatória

Return Value

Cor(r,g,b)

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

26.3.2 Class Variables

Name	Description
BLACK	Value: (0, 0, 0)
BLUE	Value: (68, 204, 230)
GRAY	Value: (228, 228, 228)
GREEN	Value: (0, 255, 0)

continued on next page

Name	Description
PINK	Value: (255, 0, 255, 255)
RED	Value: (255, 0, 0)
TRANSPARENT	Value: (255, 255, 255, 0)
WHITE	Value: (255, 255, 255)
YELLOW	Value: (255, 255, 0)

26.4 Class Font

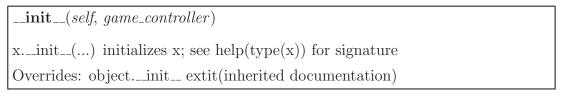
26.4.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

26.5 Class Introduction

This State is updated while our game shows the splash screen.

26.5.1 Methods



draw(self, surface, interpolate)

get_event(self, event)

Get events from Control. Changes to next state on any key press.

Overrides: state_machine._State.get_event

startup(*self*, *now*, *persistant*)

Add variables passed in persistant to the proper attributes and set the start time of the State to the current time.

Overrides: state_machine._State.startup extit(inherited documentation)

update(self, keys, now)

Updates the splash screen.

Overrides: state_machine._State.update

$Inherited\ from\ state_machine._State$

cleanup()

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

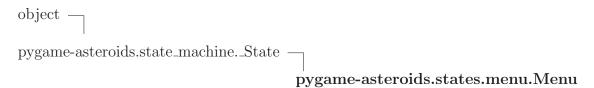
26.5.2 Properties

Name	Description
Inherited from object	
_class	

27 Module pygame-asteroids.states.menu

The splash screen of the game. The first thing the user sees.

27.1 Class Menu



This State is updated while our game shows the splash screen.

27.1.1 Methods

__init__(self, game_controller)
Construtor

Parameters

game_controller:

Return Value

Instância

Overrides: object.__init__

update(self, keys, now)

Update function for state. Must be overloaded in children.

Overrides: pygame-asteroids.state_machine._State.update extit(inherited documentation)

 $\mathbf{draw}(\mathit{self}, \mathit{surface}, \mathit{interpolate})$

get_event(self, event)

Get events from Control. Changes to next state on any key press.

Overrides: pygame-asteroids.state_machine._State.get_event

startup(self, now, persistant)

Ao iniciar State

Parameters

now:

persistant:

Overrides: pygame-asteroids.state_machine._State.startup

$Inherited\ from\ pygame-asteroids.state_machine._State$

cleanup()

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

27.1.2 Properties

Name	Description
Inherited from object	
class	

28 Module pygame-asteroids.states.seal'

Tela como selo de classificação do jogo. Segunda coisa que o jogador visualiza.

28.1 Functions

 $decode_joystick_arrow_to_keyboard_key(joystick)$

getpagesize(...)

getrlimit(...)

getrusage(...)

is_event_type_an_input_down(event)

setrlimit(...)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

28.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1

continued on next page

Name	Description
RLIMIT_MEMLOCK	Value: 6
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids.states'

28.3 Class Color

Representa cor

28.3.1 Methods

 ${\bf color_replace}(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar
replace_color: Cor a substituir

Return Value

Image Modificada

 $\mathbf{hex_to_rgb}(value)$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

random_color()

Retorna cor aleatória

Return Value

Cor(r,g,b)

$rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

28.3.2 Class Variables

Name	Description
BLACK	Value: (0, 0, 0)
BLUE	Value: (68, 204, 230)
GRAY	Value: (228, 228, 228)
GREEN	Value: (0, 255, 0)
PINK	Value: (255, 0, 255, 255)
RED	Value: (255, 0, 0)
TRANSPARENT	Value: (255, 255, 255, 0)
WHITE	Value: (255, 255, 255)
YELLOW	Value: (255, 255, 0)

28.4 Class Font

28.4.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

28.5 Class Seal

object —
state_machine._State —
pygame-asteroids.states.seal.Seal

This State is updated while our game shows the splash screen.

28.5.1 Methods

__init__(self, game_controller)

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self, surface, interpolate)

get_event(self, event)

Get events from Control. Changes to next state on any key press.

Overrides: state_machine._State.get_event

update(self, keys, now)

Updates the splash screen.

Overrides: state_machine._State.update

$Inherited\ from\ state_machine._State$

cleanup(), startup()

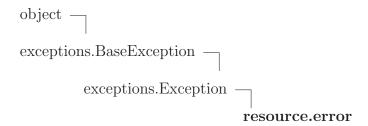
Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

28.5.2 Properties

Name	Description
Inherited from object	
class	

28.6 Class error



28.6.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

28.6.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
_class	

28.7 Class struct_rusage

resource.struct_rusage

struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of
 (utime,stime,maxrss,ixrss,idrss,isrss,minflt,majflt,

nswap,inblock,oublock,msgsnd,msgrcv,nsignals,nvcsw,nivcsw)
or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

28.7.1 Methods



 $\frac{\text{_-contains}_{--}(x, y)}{\text{y in x}}$

 $\frac{-\mathbf{eq}_{--}(x, y)}{\mathbf{x} == \mathbf{y}}$

 $\frac{\mathbf{ge}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\frac{-\text{getitem}_{--}(x, y)}{\mathbf{x}[\mathbf{y}]}$

 $_$ getslice $_(x, i, j)$

x[i:j]

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{x > y}$

 $\frac{-\text{hash}_{-}(x)}{\text{hash}(x)}$ Overrides: object.__hash__

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

$\underline{}$ len(x)	
len(x)	

$$\frac{-\mathbf{lt}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$$

$$\frac{\mathbf{x}^{-\mathbf{mul}_{--}}(x, n)}{\mathbf{x}^{+\mathbf{n}}}$$

$$\frac{-\mathbf{ne}_{-}(x, y)}{x!=y}$$

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
\frac{-\mathbf{repr}_{--}(x)}{\operatorname{repr}(x)}
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __init__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

28.7.2 Properties

Name	Description
ru_idrss	unshared data size
ru_inblock	block input operations

 $continued\ on\ next\ page$

Name	Description
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
class	

28.7.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
n_unnamed_fields	Value: 0

29 Package pygame-asteroids.states'

29.1 Modules

• franchise': Tela como selo de classificação do jogo. (Section 25, p. 152)

• intro': Tela inicial do jogo. (Section 26, p. 161)

• seal': Tela como selo de classificação do jogo. (Section 28, p. 167)

29.2 Variables

Name	Description
_package	Value: None

30 Module pygame-asteroids.test_audio'

30.1 Functions

decode_joystick_arrow_to_keyboard_key(joystick)

getpagesize(...)

 $\mathbf{getrlimit}(...)$

getrusage(...)

is_event_type_an_input_down(event)

main()

setrlimit(...)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

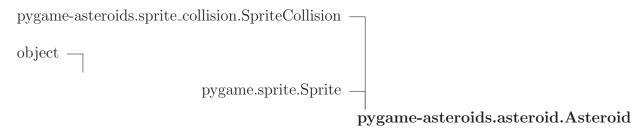
30.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6

continued on next page

Name	Description
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'

30.3 Class Asteroid



Representa o asteroid

30.3.1 Methods

__init__(self, location, size, angle, game_controller, from_color=(255, 0, 255), to_color=(255, 0, 0, 255), *groups)

Construtor

Overrides: object.__init__

destroy(self, angle)

Destruir asteroids

Parameters
angle: Ângulo

 $\mathbf{rotate}(\mathit{self})$

scale(self, size)

update(self, time)

Atualizar

Parameters

time: Delta Time

 $Overrides:\ pygame.sprite.Sprite.update$

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

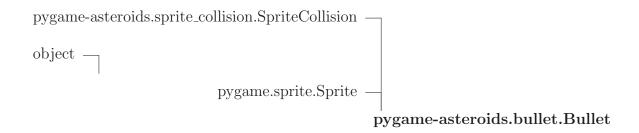
30.3.2 Properties

Name	Description
Inherited from object	
class	

30.3.3 Class Variables

Name	Description
SECTIONS	Value: 2
SPEED	Value: 0.5

30.4 Class Bullet



Bala

30.4.1 Methods

```
__init__(self, location, angle, game_controller, *groups)

Construtor

Parameters
    location:
    angle:
    game_controller:
    groups:

Return Value
    Instância

Overrides: object.__init__
```

```
\frac{\mathbf{destroy}(\mathit{self})}{\mathbf{Destruir}}
```

```
update(self, time)

Atualizar

Parameters
    time: Delta time

Overrides: pygame.sprite.Sprite.update
```

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

```
collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()
```

$Inherited\ from\ pygame.sprite. Sprite$

```
_repr_(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

30.4.2 Properties

Name	Description
Inherited from object	
class	

30.5 Class Color

Representa cor

30.5.1 Methods

 $\mathbf{hex_to_rgb}(\mathit{value})$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

 $random_color()$

Retorna cor aleatória

Return Value

Cor(r,g,b)

 ${\bf color_replace}(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

30.5.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

30.6 Class DataHandler

30.6.1 Methods

 $\mathbf{defaultscore}(\mathit{self})$

30.7 Class FileManager

30.7.1 Methods

get_pickle_fixed_protocol(self)

 $load(self, file_name, file_format = \{ 'asteroide': -1, 'controle': 1, 'janela': 2, 'mostrar_mo..., sep=' ')$

Carregar arquivo

Parameters

file_name: Nome do arquivo

file_format: Formato do arquivo

sep: Separador

Return Value

Mapa preenchido

marshal(self, file_name, object)

unmarshal(self, file_name)

unmarshal_marshal(self, file_name, default_object)

30.7.2 Class Variables

Name	Description
CHARSET	Value: 'utf-8'

30.8 Class Font

30.8.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

30.9 Class Game

30.9.1 Methods

```
\_\_init\_\_(self, map)
```

create_empty_actions()

30.10 Class GameController

object —

pygame-asteroids.game.GameController

Controlador do Jogo

30.10.1 Methods

Construtor

Parameters

screen:

file_manager:

asset_manager:

config:

score_data:

Overrides: object.__init__

announcelevel(self, time, screen)

Mostrar na tela o nível

Parameters

time: Delta time

screen: Tela

 $create_asteroids(self)$

Criar asteroids

 $create_random_asteroids(self, count)$

Cria asteroids aleatoriamente

Parameters

self:

Return Value

asteroids

draw_game_over(self, screen, event, time)

Desenhar fim de jogo

Parameters

screen: Tela

event: Evento

time: Delta Time

draw_hud(self, screen, time)

Desenha head-up display

Parameters

screen: Tela

get_display_center(self)

get_user_score_on_ranking(self)

initialize_joystick(self)

main(self, screen)

quit(self)

 $random_position(self)$

save_score(self, user_name)

screen_rect(self)

Retangulo com o tamanho da tela

Return Value

Retangulo

$show_fps(self)$

Display the current FPS in the window handle if fps_visible is True.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

30.10.2 Properties

Name	Description
Inherited from object	
class	

30.10.3 Class Variables

Name	Description
newhiscore	Value: 0
running	Value: 0

30.11 Class ResourceManager

Gerenciador de Recursos

30.11.1 Methods

init(self, dir_root=None)
Construtor
Parameters dir_root: Diretório raiz
Return Value Instância

get_font(*self*, *size*=30)

Obtém Fonte padrão

Parameters

size: Tamanho

Return Value

Fonte

get_font_by_name(self, name, size)

Obtém Fonte pelo nome

Parameters

name: Nome

size: Tamanho

Return Value

Fonte

get_font_default_name(self)

Obtém Fonte padrão

Return Value

Fonte

get_font_large(self, name)

Obtém Fonte Grande

Parameters

name: Nome

Return Value

Fonte

get_font_normal(self, name)

Obtém Fonte Normal

Parameters

name: Nome

Return Value

Fonte

get_font_path(self, name)

Obtém caminho da fonte

Parameters

name: Nome

Return Value

Fonte

get_font_small(self, name)

Obtém Fonte pequena

Parameters

name: Nome

Return Value

Fonte

$\mathbf{get_font_very_small}(\mathit{self}, \mathit{name})$

Obtém Fonte muito pequena

Parameters

name: Nome

Return Value

Fonte

get_image(self, name)

Obtém imagem

Parameters

name: Nome

Return Value

Imagem

$get_scalled_image(self, name, scale)$

 $init_mixer(self)$

Inicia mixer

list_files(self, dir)

load(self, dir_root)	
Carregar	
Parameters	
dir_root: Diretório raiz	

 $\frac{\mathbf{load_font}(\mathit{self})}{\mathbf{Carregar\ fontes}}$

 $\frac{\mathbf{load_image}(\mathit{self})}{\mathbf{Carregar\ imagens}}$

 $\frac{\mathbf{load_music}(\mathit{self})}{\mathbf{Carregar\ efeitos\ sonoros}}$

 $\frac{\mathbf{load_sound}(\mathit{self})}{\mathbf{Carregar\ efeitos\ sonoros}}$

 $\frac{\text{play_music}(\textit{self}, \textit{name}, \textit{loops}=1)}{\text{Reproduz música}}$

Parameters

name: Nome

loops: Quantas vezes repetir

play_sound(self, name, loops=1)
Reproduzir efeito sonoro

name: Nome
loops: Repetição

30.11.2 Class Variables

Parameters

Name	Description
fonts	Value: {}
images	Value: {}
musics	Value: {}
sounds	Value: {}

30.12 Class Ship

```
pygame-asteroids.sprite_collision.SpriteCollision — object — pygame.sprite.Sprite — pygame-asteroids.ship.Ship
```

Nave

30.12.1 Methods

```
__init__(self, location, game_controller, *groups)

Construtor

Parameters
    location:
    game_controller:
    groups:

Return Value
    Instância

Overrides: object.__init__
```

```
accelerate(self, angle)
```

```
accelerate_speed(self, angle, x, y)

Acelerar

Parameters
    angle: Ângulo
    x: Posição X
    y: Posição Y
```

```
\frac{\mathbf{shoot}(self)}{\mathbf{Atirar}}
```

```
\mathbf{get\_center}(self)
```

explode(self, time)

Explidir nave

Parameters

time: Delta Time

left(self, time)

right(self, time)

 $\mathbf{up}(self)$

rotate(self, angle)

update(*self*, *time*)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

30.12.2 Properties

Name	Description
Inherited from object	
class	

30.12.3 Class Variables

Name	Description
SPEED_ACCELERATE	Velociadade de aceleração
	Value: 0.025
SPEED_ROTATE	Velocidade de rotação
	Value: 0.4
TIME_LOAD	Tempo para carregar
	Value: 200.0
TIME_RELOAD_SHOT	Tempo para recarregar
	Value: 100

30.13 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

30.13.1 Methods

Iniciliza retângulo

Parameters

location:

game_controller:

get_class_name(self)

Retorna nome da classe instanciada

Return Value

Nome

screencollision(*self*, *time*)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

30.14 Class SpriteGroup

object —

 $pygame.sprite. AbstractGroup \ -$

pygame.sprite.Group

pygame-asteroids.game.SpriteGroup

Agrupado de Sprites

30.14.1 Methods

draw2(self, screen)

Desenhar na tela

Parameters

screen: Tela

Inherited from pygame.sprite.Group

__init__()

$Inherited\ from\ pygame.sprite.AbstractGroup$

contains(), _iter_(), _len_(), _nonzero_(), _repr_(), add(), add_internal(), clear(), copy(), draw(), empty(), has(), has_internal(), remove(), remove_internal(), sprites(), update()

Inherited from object

30.14.2 Properties

Name	Description
Inherited from object	
class	

30.15 Class StarField

object — pygame-asteroids.start_field.StarField

30.15.1 Methods

__init__(self, screen)
Create the starfield
Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

 $\mathbf{draw}(self)$

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

30.15.2 Properties

Name	Description
Inherited from object	
class	

30.15.3 Class Variables

Name	Description
NUM_STARS	Value: 30
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

30.16 Class TextInput

object —

pygame-asteroids.virtual_keyboard.TextInput

Handles the text input box and manages the cursor

30.16.1 Methods

__init__(self, background, screen, font, text, x, y)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

 $\frac{\mathbf{draw}(self)}{\mathbf{Draw the text input box}}$

flashcursor(self)
Toggle visibility of the cursor

addcharatcursor(self, letter)

Add a character whereever the cursor is currently located

backspace(self)

Delete a character before the cursor position

 $\mathbf{deccursor}(self)$

Move the cursor one space left

inccursor(self)

Move the cursor one space right (but not beyond the end of the text)

drawcursor(self)

Draw the cursor

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

30.16.2 Properties

Name	Description
Inherited from object	
_class	

30.17 Class TouchButtons

30.17.1 Methods

__init__(self, screen, button_width=40)

create_touch_buttons(self, button_width)

draw(self)

detect_actions(self, event, actions)

30.18 Class VirtualKey

object —

pygame-asteroids.virtual_keyboard.VirtualKey

A single key for the VirtualKeyboard

30.18.1 Methods

 $_init_(self, caption, x, y, w=67, h=67)$

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object._init_ extit(inherited documentation)

draw(self, screen, background, shifted=False, forcedraw=False)

Draw one key if it needs redrawing

Inherited from object

30.18.2 Properties

Name	Description
Inherited from object	
_class	

30.19 Class VirtualKeyboard

object —

$pygame-asteroids.virtual_keyboard.VirtualKeyboard\\$

Implement a basic full screen virtual keyboard for touchscreens

30.19.1 Methods

run(self, screen, font, text='', callback=None)

not_null(self, text)

unselectall(self, force=False)

Force all the keys to be unselected Marks any that change as dirty to redraw

clickatmouse(self)

Check to see if the user is pressing down on a key and draw it selected

$\mathbf{togglecaps}(self)$

Toggle uppercase / lowercase

selectatmouse(self)

User has clicked a key, let's use it

addkeys(self)

Adds the setup for the keys. This would be easy to modify for additional keys

The default start position places the keyboard slightly left of center by design so many people have issues with the right side of their touchscreens that I did this on purpose.

paintkeys(self)

Draw the keyboard (but only if they're dirty.)

clear(self)

Put the screen back to before we started

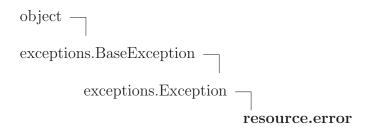
Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

30.19.2 Properties

Name	Description
Inherited from object	
class	

30.20 Class error



30.20.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

30.20.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

30.21 Class struct_rusage

object — resource.struct_rusage
struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of (utime, stime, maxrss, ixrss, idrss, isrss, minflt, majflt,

nswap,inblock,oublock,msgsnd,msgrcv,nsignals,nvcsw,nivcsw)
or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

30.21.1 Methods

$\boxed{\text{\add}_{\text{\}}(x, y)}$	
x+y	

 $\frac{\text{_-contains}_{\text{_-}}(x, y)}{\text{y in x}}$

 $\frac{-\mathbf{eq}_{--}(x, y)}{\mathbf{x} == \mathbf{y}}$

 $\frac{\mathbf{ge}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\frac{-\text{getitem}_{--}(x, y)}{\mathbf{x}[\mathbf{y}]}$

 $_$ getslice $_(x, i, j)$

x[i:j]

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{\mathbf{x} > \mathbf{y}}$

 $\frac{-\text{hash}_{-}(x)}{\text{hash}(x)}$ Overrides: object.__hash__

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

-len (x)	
$\operatorname{len}(x)$	

$$\frac{-\mathbf{lt}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$$

$$\frac{\mathbf{x}^{-\mathbf{mul}_{--}}(x, n)}{\mathbf{x}^{+\mathbf{n}}}$$

$$\frac{-\mathbf{ne}_{-}(x, y)}{x!=y}$$

__new__(*T*, *S*, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
\frac{-\mathbf{repr}_{--}(x)}{\operatorname{repr}(x)}
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
\label{eq:condition} $$ $\_-delattr_-(), \_-format_-(), \_-getattribute_-(), \_-init_-(), \_-reduce_ex_-(), \_-setattr_-(), \_-sizeof_-(), \_-str_-(), \_-subclasshook_-() $$
```

30.21.2 Properties

Name	Description
ru_idrss	unshared data size
ru_inblock	block input operations

 $continued\ on\ next\ page$

Name	Description
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
class	

30.21.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
n_unnamed_fields	Value: 0

31 Module pygame-asteroids.test_rotation'

31.1 Functions

 $decode_joystick_arrow_to_keyboard_key(joystick)$

getpagesize(...)

getrlimit(...)

getrusage(...)

is_event_type_an_input_down(event)

main()

 $\mathbf{setrlimit}(...)$

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

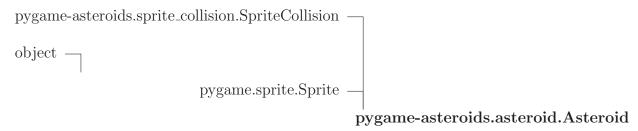
31.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6

continued on next page

Name	Description
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'

31.3 Class Asteroid



Representa o asteroid

31.3.1 Methods

__init__(self, location, size, angle, game_controller, from_color=(255, 0, 255), to_color=(255, 0, 0, 255), *groups)

Construtor

Overrides: object.__init__

destroy(self, angle)
Destruir asteroids
Parameters
angle: Ângulo

```
\mathbf{rotate}(self)
```

scale(self, size)

update(self, time)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

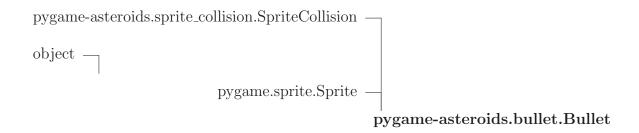
31.3.2 Properties

Name	Description
Inherited from object	
class	

31.3.3 Class Variables

Name	Description
SECTIONS	Value: 2
SPEED	Value: 0.5

31.4 Class Bullet



Bala

31.4.1 Methods

```
__init__(self, location, angle, game_controller, *groups)

Construtor

Parameters
    location:
    angle:
    game_controller:
    groups:

Return Value
    Instância

Overrides: object.__init__
```

```
destroy(self)
Destruir
```

```
update(self, time)

Atualizar

Parameters
    time: Delta time

Overrides: pygame.sprite.Sprite.update
```

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

```
collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()
```

$Inherited\ from\ pygame.sprite. Sprite$

```
_repr_(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

31.4.2 Properties

Name	Description
Inherited from object	
_class	

31.5 Class Color

Representa cor

31.5.1 Methods

 $\mathbf{hex_to_rgb}(\mathit{value})$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

 $random_color()$

Retorna cor aleatória

Return Value

Cor(r,g,b)

 ${\bf color_replace}(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

31.5.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

31.6 Class DataHandler

31.6.1 Methods

 $\mathbf{defaultscore}(\mathit{self})$

31.7 Class FileManager

31.7.1 Methods

get_pickle_fixed_protocol(self)

 $load(self, file_name, file_format = \{ 'asteroide': -1, 'controle': 1, 'janela': 2, 'mostrar_mo..., sep=' ')$

Carregar arquivo

Parameters

file_name: Nome do arquivo

file_format: Formato do arquivo
sep: Separador

Return Value

Mapa preenchido

marshal(self, file_name, object)

unmarshal(self, file_name)

unmarshal_marshal(self, file_name, default_object)

31.7.2 Class Variables

Name	Description
CHARSET	Value: 'utf-8'

31.8 Class Font

31.8.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

31.9 Class Game

31.9.1 Methods

```
\_\_init\_\_(self, map)
```

create_empty_actions()

31.10 Class GameController

object —

pygame-asteroids.game.GameController

Controlador do Jogo

31.10.1 Methods

```
\_init\_(self, game_name, screen, file_manager, asset_manager, config, score_data)
```

Construtor

Parameters

screen:

file_manager:

asset_manager:

config:

score_data:

Overrides: object.__init__

announcelevel(self, time, screen)

Mostrar na tela o nível

Parameters

time: Delta time

screen: Tela

 $create_asteroids(self)$

Criar asteroids

create_random_asteroids(self, count)

Cria asteroids aleatoriamente

Parameters

self:

Return Value

asteroids

draw_game_over(self, screen, event, time)

Desenhar fim de jogo

Parameters

screen: Tela

event: Evento

time: Delta Time

draw_hud(self, screen, time)

Desenha head-up display

Parameters

screen: Tela

get_display_center(self)

get_user_score_on_ranking(self)

initialize_joystick(self)

main(self, screen)

quit(self)

 $random_position(self)$

save_score(self, user_name)

screen_rect(self)

Retangulo com o tamanho da tela

Return Value

Retangulo

$show_fps(self)$

Display the current FPS in the window handle if fps_visible is True.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

31.10.2 Properties

Name	Description
Inherited from object	
class	

31.10.3 Class Variables

Name	Description
newhiscore	Value: 0
running	Value: 0

31.11 Class ResourceManager

Gerenciador de Recursos

31.11.1 Methods

$__init__(self, dir_root = None)$
Construtor
Parameters dir_root: Diretório raiz
Return Value Instância

get_font(*self*, *size*=30)

Obtém Fonte padrão

Parameters

size: Tamanho

Return Value

Fonte

get_font_by_name(self, name, size)

Obtém Fonte pelo nome

Parameters

name: Nome

size: Tamanho

Return Value

Fonte

get_font_default_name(self)

Obtém Fonte padrão

Return Value

Fonte

get_font_large(self, name)

Obtém Fonte Grande

Parameters

name: Nome

Return Value

Fonte

get_font_normal(self, name)

Obtém Fonte Normal

Parameters

name: Nome

Return Value

Fonte

get_font_path(self, name)

Obtém caminho da fonte

Parameters

name: Nome

Return Value

Fonte

get_font_small(self, name)

Obtém Fonte pequena

Parameters

name: Nome

Return Value

Fonte

 $\mathbf{get_font_very_small}(\mathit{self}, \mathit{name})$

Obtém Fonte muito pequena

Parameters

name: Nome

Return Value

Fonte

get_image(self, name)

Obtém imagem

Parameters

name: Nome

Return Value

Imagem

get_scalled_image(self, name, scale)

 $init_mixer(self)$

Inicia mixer

list_files(self, dir)

$load(self, dir_root)$	
Carregar	
Parameters	
dir_root: Diretório raiz	

load_font(self)
Carregar fontes

 $\frac{\mathbf{load_music}(\mathit{self})}{\mathbf{Carregar\ efeitos\ sonoros}}$

load_sound(self)
Carregar efeitos sonoros

play_music(self, name, loops=1)

Reproduz música

Parameters

name: Nome

loops: Quantas vezes repetir

 $\mathbf{play_sound}(\mathit{self}, \mathit{name}, \mathit{loops}{=}1)$

Reproduzir efeito sonoro

Parameters

name: Nome
loops: Repetição

31.11.2 Class Variables

Name	Description
fonts	Value: {}
images	Value: {}
musics	Value: {}
sounds	Value: {}

31.12 Class Ship

```
pygame-asteroids.sprite_collision.SpriteCollision —
object —
pygame.sprite.Sprite —
pygame-asteroids.ship.Ship
```

Nave

31.12.1 Methods

```
__init__(self, location, game_controller, *groups)
Construtor

Parameters
    location:
    game_controller:
    groups:

Return Value
    Instância
Overrides: object.__init__
```

```
accelerate(self, angle)
```

```
accelerate_speed(self, angle, x, y)

Acelerar

Parameters
    angle: Ângulo
    x: Posição X
    y: Posição Y
```

```
\frac{\mathbf{shoot}(\mathit{self})}{\mathbf{Atirar}}
```

```
\mathbf{get\_center}(self)
```

explode(self, time)

Explidir nave

Parameters

time: Delta Time

left(self, time)

right(self, time)

 $\mathbf{up}(self)$

rotate(self, angle)

update(*self*, *time*)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

31.12.2 Properties

Name	Description
Inherited from object	
class	

31.12.3 Class Variables

Name	Description
SPEED_ACCELERATE	Velociadade de aceleração
	Value: 0.025
SPEED_ROTATE	Velocidade de rotação
	Value: 0.4
TIME_LOAD	Tempo para carregar
	Value: 200.0
TIME_RELOAD_SHOT	Tempo para recarregar
	Value: 100

31.13 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

31.13.1 Methods

Iniciliza retângulo

Parameters

location:

game_controller:

get_class_name(self)

Retorna nome da classe instanciada

Return Value

Nome

screencollision(*self*, *time*)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

31.14 Class SpriteGroup

object —

pygame.sprite.AbstractGroup -

pygame.sprite.Group

pygame-asteroids.game.SpriteGroup

Agrupado de Sprites

31.14.1 Methods

draw2(self, screen)

Desenhar na tela

Parameters

screen: Tela

Inherited from pygame.sprite.Group

__init__()

$Inherited\ from\ pygame.sprite.AbstractGroup$

contains(), _iter_(), _len_(), _nonzero_(), _repr_(), add(), add_internal(), clear(), copy(), draw(), empty(), has(), has_internal(), remove(), remove_internal(), sprites(), update()

Inherited from object

31.14.2 Properties

Name	Description
Inherited from object	
class	

31.15 Class StarField

object — pygame-asteroids.start_field.StarField

31.15.1 Methods

__init__(self, screen)
Create the starfield
Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

 $\mathbf{draw}(self)$

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

31.15.2 Properties

Name	Description
Inherited from object	
class	

31.15.3 Class Variables

Name	Description
NUM_STARS	Value: 30
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

31.16 Class TextInput

object —

pygame-asteroids.virtual_keyboard.TextInput

Handles the text input box and manages the cursor

31.16.1 Methods

__init__(self, background, screen, font, text, x, y)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self)
Draw the text input box

flashcursor(self)
Toggle visibility of the cursor

Add a character whereever the cursor is currently located

backspace(self)

Delete a character before the cursor position

 $\mathbf{deccursor}(self)$

Move the cursor one space left

inccursor(self)

Move the cursor one space right (but not beyond the end of the text)

drawcursor(self)

Draw the cursor

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

31.16.2 Properties

Name	Description
Inherited from object	
class	

31.17 Class TouchButtons

31.17.1 Methods

__init__(self, screen, button_width=40)

create_touch_buttons(self, button_width)

draw(self)

detect_actions(self, event, actions)

31.18 Class VirtualKey

object —

pygame-asteroids.virtual_keyboard.VirtualKey

A single key for the VirtualKeyboard

31.18.1 Methods

 $_$ **init** $_(self, caption, x, y, w=67, h=67)$

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self, screen, background, shifted = False, forcedraw = False)

Draw one key if it needs redrawing

Inherited from object

31.18.2 Properties

Name	Description
Inherited from object	
class	

31.19 Class VirtualKeyboard

object —

$pygame-asteroids.virtual_keyboard.VirtualKeyboard\\$

Implement a basic full screen virtual keyboard for touchscreens

31.19.1 Methods

run(self, screen, font, text='', callback=None)

not_null(self, text)

unselectall(self, force=False)

Force all the keys to be unselected Marks any that change as dirty to redraw

clickatmouse(self)

Check to see if the user is pressing down on a key and draw it selected

$\mathbf{togglecaps}(self)$

Toggle uppercase / lowercase

selectatmouse(self)

User has clicked a key, let's use it

addkeys(self)

Adds the setup for the keys. This would be easy to modify for additional keys

The default start position places the keyboard slightly left of center by design so many people have issues with the right side of their touchscreens that I did this on purpose.

paintkeys(self)

Draw the keyboard (but only if they're dirty.)

clear(self)

Put the screen back to before we started

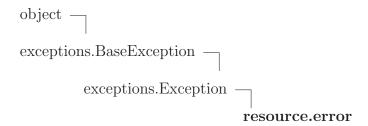
Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

31.19.2 Properties

Name	Description
Inherited from object	
class	

31.20 Class error



31.20.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

31.20.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

31.21 Class struct_rusage

resource.struct_rusage

struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of
 (utime,stime,maxrss,ixrss,idrss,isrss,minflt,majflt,

nswap,inblock,oublock,msgsnd,msgrcv,nsignals,nvcsw,nivcsw)
or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

31.21.1 Methods

$\boxed{\text{\add}_{\text{\}}(x, y)}$	
x+y	

 $\frac{\text{_-contains}_{\text{_-}}(x, y)}{\text{y in x}}$

 $\frac{-\operatorname{eq}_{--}(x, y)}{x = = y}$

 $\frac{\mathbf{ge}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\frac{\text{_-getitem}_{\text{--}}(x, y)}{\mathbf{x}[\mathbf{y}]}$

 $__\mathbf{getslice}__(x,\ i,\ j)$

x[i:j]

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{\mathbf{x} > \mathbf{y}}$

 $\frac{-\text{hash}_{-}(x)}{\text{hash}(x)}$ Overrides: object.__hash__

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

$\phantom{aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa$	
len(x)	

$$\frac{-\mathbf{lt}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$$

$$\frac{\mathbf{x}^{\mathbf{mul}}(x, n)}{\mathbf{x}^{\mathbf{n}}}$$

$$\frac{-\mathbf{ne}_{-}(x, y)}{x!=y}$$

 $_{-}$ **new** $_{-}$ (T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
-_repr__(x)
repr(x)
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __init__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

31.21.2 Properties

Name	Description
ru_idrss	unshared data size
ru_inblock	block input operations

 $continued\ on\ next\ page$

Name	Description
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
_class	

31.21.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
n_unnamed_fields	Value: 0

32 Module pygame-asteroids.test_startfield'

32.1 Functions

32.2 Variables

Name	Description
package	Value: 'pygame-asteroids'

32.3 Class StarField

object — pygame-asteroids.start_field.StarField

32.3.1 Methods

__init__(self, screen)
Create the starfield
Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

 $\mathbf{draw}(self)$

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

32.3.2 Properties

Name	Description
Inherited from object	
class	

32.3.3 Class Variables

Name	Description
NUM_STARS	Value: 30
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

33 Module pygame-asteroids.test_touch_buttons'

33.1 Functions

 $\mathbf{decode_joystick_arrow_to_keyboard_key}(joystick)$

getpagesize(...)

getrlimit(...)

getrusage(...)

is_event_type_an_input_down(event)

main()

 $\mathbf{setrlimit}(...)$

vc_get_angle(center, pos)

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y: 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

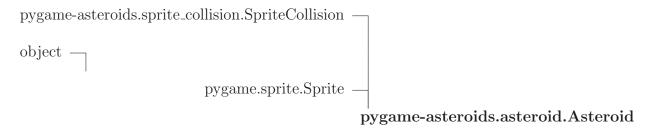
33.2 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6

continued on next page

Name	Description
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'

33.3 Class Asteroid



Representa o asteroid

33.3.1 Methods

__init__(self, location, size, angle, game_controller, from_color=(255, 0, 255), to_color=(255, 0, 0, 255), *groups)

Construtor

Overrides: object.__init__

destroy(self, angle)

Destruir asteroids

Parameters
angle: Ângulo

```
\mathbf{rotate}(\mathit{self})
```

scale(self, size)

update(self, time)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

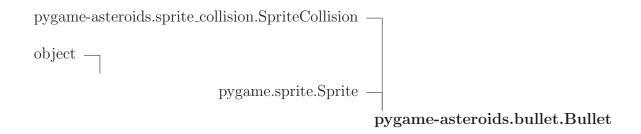
33.3.2 Properties

Name	Description
Inherited from object	
class	

33.3.3 Class Variables

Name	Description
SECTIONS	Value: 2
SPEED	Value: 0.5

33.4 Class Bullet



Bala

33.4.1 Methods

```
__init__(self, location, angle, game_controller, *groups)

Construtor

Parameters
    location:
    angle:
    game_controller:
    groups:

Return Value
    Instância

Overrides: object.__init__
```

```
\frac{\mathbf{destroy}(\mathit{self})}{\mathbf{Destruir}}
```

```
update(self, time)

Atualizar

Parameters
    time: Delta time

Overrides: pygame.sprite.Sprite.update
```

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

```
collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()
```

Inherited from pygame.sprite.Sprite

```
_repr_(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()
```

Inherited from object

33.4.2 Properties

Name	Description
Inherited from object	
_class	

33.5 Class Color

Representa cor

33.5.1 Methods

 $\mathbf{hex_to_rgb}(\mathit{value})$

Hexadecimal para RGB

Parameters

value: Valor hexadecimal

Return Value Cor RGB

 $rgb_to_hex(rgb)$

Converte cor rgb em hexadecimal

Parameters

rgb: Cor rgb

Return Value

Cor Hexadecimal

random_color()

Retorna cor aleatória

Return Value

Cor(r,g,b)

 $color_replace(surface, find_color, replace_color)$

Substitui cor da image

Parameters

surface: Imagem

find_color: Cor a procurar replace_color: Cor a substituir

Return Value

Image Modificada

33.5.2 Class Variables

Name	Description
WHITE	Branco
	Value: (255, 255, 255)
RED	Vermelho
	Value: (255, 0, 0)
GREEN	Verde
	Value: (0, 255, 0)
BLACK	Preto
	Value: (0, 0, 0)
YELLOW	Amarelo
	Value: (255, 255, 0)
BLUE	Azul
	Value: (68, 204, 230)
TRANSPARENT	Transparente
	Value: (255, 255, 255, 0)
PINK	Rosa
	Value: (255, 0, 255, 255)
GRAY	Cinza
	Value: (228, 228, 228)

33.6 Class DataHandler

33.6.1 Methods

 $\mathbf{defaultscore}(\mathit{self})$

33.7 Class FileManager

33.7.1 Methods

get_pickle_fixed_protocol(self)

 $load(self, file_name, file_format = \{ 'asteroide': -1, 'controle': 1, 'janela': 2, 'mostrar_mo..., sep=' ')$

Carregar arquivo

Parameters

file_name: Nome do arquivo

file_format: Formato do arquivo

sep: Separador

Return Value

Mapa preenchido

marshal(self, file_name, object)

 $\mathbf{unmarshal}(\mathit{self},\mathit{file_name})$

unmarshal_marshal(self, file_name, default_object)

33.7.2 Class Variables

Name	Description
CHARSET	Value: 'utf-8'

33.8 Class Font

33.8.1 Class Variables

Name	Description
LARGE	Value: 60
MEDIUM	Value: 40
NORMAL	Value: 30
SMALL	Value: 20
VERY_SMALL	Value: 15

33.9 Class Game

33.9.1 Methods

 $_$ init $_$ (self, map)

create_empty_actions()

33.10 Class ResourceManager

Gerenciador de Recursos

33.10.1 Methods

 $_$ init $_$ ($self, dir_root =$ None)

Construtor

Parameters

dir_root: Diretório raiz

Return Value

Instância

get_font(self, size=30)

Obtém Fonte padrão

Parameters

size: Tamanho

Return Value

Fonte

get_font_by_name(self, name, size)

Obtém Fonte pelo nome

Parameters

name: Nome

size: Tamanho

Return Value

Fonte

get_font_default_name(self)

Obtém Fonte padrão

Return Value

Fonte

get_font_large(self, name)

Obtém Fonte Grande

Parameters

name: Nome

Return Value

Fonte

 $\mathbf{get_font_normal}(\mathit{self}, \mathit{name})$

Obtém Fonte Normal

Parameters

name: Nome

Return Value

Fonte

get_font_path(self, name)

Obtém caminho da fonte

Parameters

name: Nome

Return Value

Fonte

get_font_small(self, name)

Obtém Fonte pequena

Parameters

name: Nome

Return Value

Fonte

 $\mathbf{get_font_very_small}(\mathit{self}, \mathit{name})$ Obtém Fonte muito pequena **Parameters** name: Nome Return Value Fonte get_image(self, name) Obtém imagem **Parameters** name: Nome Return Value Imagem get_scalled_image(self, name, scale) $init_mixer(self)$ Inicia mixer list_files(self, dir) load(self, dir_root) Carregar **Parameters** dir_root: Diretório raiz load_font(self) Carregar fontes $load_image(self)$ Carregar imagens $load_music(self)$ Carregar efeitos sonoros load_sound(self)

Carregar efeitos sonoros

play_music(self, name, loops=1)

Reproduz música

Parameters

name: Nome

loops: Quantas vezes repetir

play_sound(self, name, loops=1)

Reproduzir efeito sonoro

Parameters

name: Nome

loops: Repetição

33.10.2 Class Variables

Name	Description
fonts	Value: {}
images	Value: {}
musics	Value: {}
sounds	Value: {}

33.11 Class Ship



Nave

33.11.1 Methods

__init__(self, location, game_controller, *groups) Construtor **Parameters** location: game_controller: groups: Return Value Instância Overrides: object.__init__ accelerate(self, angle) $accelerate_speed(self, angle, x, y)$ Acelerar Parameters angle: Ângulo Posição X x:Posição Y у: $\mathbf{shoot}(\mathit{self})$ Atirar get_center(self) **explode**(*self*, *time*) Explidir nave **Parameters** time: Delta Time **left**(self, time) **right**(self, time) $\mathbf{up}(self)$

rotate(self, angle)

update(self, time)

Atualizar

Parameters

time: Delta Time

Overrides: pygame.sprite.Sprite.update

$Inherited\ from\ pygame-asteroids.sprite_collision.SpriteCollision(Section\ 33.12)$

collision(), draw2(), get_class_name(), initrect(), rectupdate(), screencollision()

Inherited from pygame.sprite.Sprite

__repr__(), add(), add_internal(), alive(), groups(), kill(), remove(), remove_internal()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

33.11.2 Properties

Name	Description
Inherited from object	
class	

33.11.3 Class Variables

Name	Description
SPEED_ACCELERATE	Velociadade de aceleração
	Value: 0.025
SPEED_ROTATE	Velocidade de rotação
	Value: 0.4
TIME_LOAD	Tempo para carregar
	Value: 200.0
TIME_RELOAD_SHOT	Tempo para recarregar
	Value: 100

33.12 Class SpriteCollision

Known Subclasses: pygame-asteroids.asteroid.Asteroid, pygame-asteroids.bullet.Bullet, pygame-asteroids.ship.Ship

Classe principal que controla sprite e aplicada a todos os objetos em movimento

33.12.1 Methods

initrect(self, location, game_controller)

Iniciliza retângulo

Parameters

location:

game_controller:

$get_class_name(self)$

Retorna nome da classe instanciada

Return Value

Nome

screencollision(self, time)

Envolve a tela do jogo para objetos

Parameters

time: Delta time

rectupdate(self)

define qual borda colide com o objeto de colisão / blitting

draw2(self, screen)

blit de imagens para corrigir os lugares quando perto cantos / lados.

Parameters

screen: Tela

collision(self, object)

Detecta colisão

Parameters

object: Objeto

Return Value

Booleano

33.13 Class StarField

object —

pygame-asteroids.start_field.StarField

33.13.1 Methods

 $_$ **init** $_$ (self, screen)

Create the starfield

Overrides: object.__init__

move(self, start, end, direction)

Correct for stars hitting the screen's borders

fix_stars_on_screen(self, star)

draw(self)

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

33.13.2 Properties

Name	Description
Inherited from object	
_class	

33.13.3 Class Variables

Name	Description
NUM_STARS	Value: 30
WHITE	Value: (255, 255, 255)
LEFT	Value: 0
RIGHT	Value: 1
direction	Value: 0
stars	Value: []

33.14 Class TextInput

object —

pygame-asteroids.virtual_keyboard.TextInput

Handles the text input box and manages the cursor

33.14.1 Methods

__init__(self, background, screen, font, text, x, y)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self)
Draw the text input box

flashcursor(self)
Toggle visibility of the cursor

Add a character whereever the cursor is currently located

backspace(self)
Delete a character before the cursor position

deccursor(self)

Move the cursor one space left

inccursor(self)

Move the cursor one space right (but not beyond the end of the text)

drawcursor(self)

Draw the cursor

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

33.14.2 Properties

Name	Description
Inherited from object	
class	

33.15 Class TouchButtons

33.15.1 Methods

__init__(self, screen, button_width=40)

create_touch_buttons(self, button_width)

draw(self)

detect_actions(self, event, actions)

33.16 Class VirtualKey

object —

pygame-asteroids.virtual_keyboard.VirtualKey

A single key for the VirtualKeyboard

33.16.1 Methods

 $_init_(self, caption, x, y, w=67, h=67)$

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object._init_ extit(inherited documentation)

draw(self, screen, background, shifted = False, forcedraw = False)

Draw one key if it needs redrawing

Inherited from object

33.16.2 Properties

Name	Description
Inherited from object	
class	

33.17 Class VirtualKeyboard

object —

$pygame-asteroids.virtual_keyboard.VirtualKeyboard\\$

Implement a basic full screen virtual keyboard for touchscreens

33.17.1 Methods

run(self, screen, font, text=',', callback=None)

not_null(self, text)

unselectall(self, force=False)

Force all the keys to be unselected Marks any that change as dirty to redraw

clickatmouse(self)

Check to see if the user is pressing down on a key and draw it selected

$\mathbf{togglecaps}(self)$

Toggle uppercase / lowercase

selectatmouse(self)

User has clicked a key, let's use it

addkeys(self)

Adds the setup for the keys. This would be easy to modify for additional keys

The default start position places the keyboard slightly left of center by design so many people have issues with the right side of their touchscreens that I did this on purpose.

paintkeys(self)

Draw the keyboard (but only if they're dirty.)

clear(self)

Put the screen back to before we started

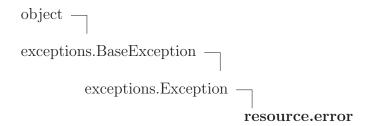
Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

33.17.2 Properties

Name	Description
Inherited from object	
class	

33.18 Class error



33.18.1 Methods

Inherited from exceptions. Exception

$Inherited\ from\ exceptions. Base Exception$

Inherited from object

33.18.2 Properties

Name	Description
Inherited from exceptions.BaseException	
args, message	
Inherited from object	
class	

33.19 Class struct_rusage

object — resource.struct_rusage
struct_rusage: Result from getrusage.

This object may be accessed either as a tuple of (utime, stime, maxrss, ixrss, idrss, isrss, minflt, majflt,

nswap,inblock,oublock,msgsnd,msgrcv,nsignals,nvcsw,nivcsw)
or via the attributes ru_utime, ru_stime, ru_maxrss, and so on.

33.19.1 Methods

$\boxed{\text{\add}_{\text{\}}(x, y)}$	
x+y	

 $\frac{\text{_-contains}_{\text{_-}}(x, y)}{\text{y in x}}$

 $\frac{-\mathbf{eq}_{--}(x, y)}{\mathbf{x} == \mathbf{y}}$

 $\frac{\mathbf{ge}_{-}(x, y)}{\mathbf{x} = \mathbf{y}}$

 $\frac{\text{_-getitem}_{--}(x, y)}{x[y]}$

 $\frac{\text{__getslice}_{_}(x, i, j)}{\text{x[i:j]}}$

Use of negative indices is not supported.

 $\frac{-\mathbf{gt}_{--}(x, y)}{x > y}$

 $\frac{-\text{hash}_{-}(x)}{\text{hash}(x)}$ Overrides: object.__hash__

 $\frac{-\mathbf{le}_{-}(x, y)}{x < = y}$

-len (x)	
$\operatorname{len}(x)$	

$$\frac{-\mathbf{lt}_{--}(x, y)}{\mathbf{x} < \mathbf{y}}$$

$$\frac{\mathbf{x}^{-\mathbf{mul}_{--}}(x, n)}{\mathbf{x}^{+\mathbf{n}}}$$

$$\frac{-\mathbf{ne}_{-}(x, y)}{x!=y}$$

__new__(*T*, *S*, ...)

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```
\frac{-\mathbf{repr}_{--}(x)}{\operatorname{repr}(x)}
Overrides: object.__repr__
```

```
\frac{-\mathbf{rmul}_{--}(x, n)}{\mathbf{n}^*\mathbf{x}}
```

Inherited from object

```
\label{lem:condition} $$ \__delattr_{-}(), \__format_{-}(), \__getattribute_{-}(), \__init_{-}(), \__reduce\_ex_{-}(), \__setattr_{-}(), \__sizeof_{-}(), \__str_{-}(), \__subclasshook_{-}() $
```

33.19.2 Properties

Name	Description
ru_idrss	unshared data size
ru_inblock	block input operations

 $continued\ on\ next\ page$

Name	Description
ru_isrss	unshared stack size
ru_ixrss	shared memory size
ru_majflt	page faults requiring I/O
ru_maxrss	max. resident set size
ru_minflt	page faults not requiring I/O
ru_msgrcv	IPC messages received
ru_msgsnd	IPC messages sent
ru_nivcsw	involuntary context switches
ru_nsignals	signals received
ru_nswap	number of swap outs
ru_nvcsw	voluntary context switches
ru_oublock	block output operations
ru_stime	system time used
ru_utime	user time used
Inherited from object	
_class	

33.19.3 Class Variables

Name	Description
n_fields	Value: 16
n_sequence_fields	Value: 16
$n_unnamed_fields$	Value: 0

$34 \quad Module\ pygame-asteroids.test_virtual_keyboard'$

34.1 Functions

34.2 Variables

Name	Description
_package	Value: 'pygame-asteroids'

35 Module pygame-asteroids.tools'

This module contains the fundamental Control class. Also contained here are resource loading functions.

35.1 Functions

```
cursor_from_image(image, size, hotspot, location=(0, 0), flip=False)
```

This function's return value is of the form accepted by pg.mouse.set_cursor() (passed using the *args syntax). The argument image is an already loaded image surface containing your desired cursor; size is a single integer corresponding to the width of the cursor (must be a multiple of 8); hotspot is a 2-tuple representing the exact point in your cursor that will represent the mouse position; location is a 2-tuple for where your cursor is located on the passed in image. Setting flip to True will create the cursor with colors opposite to the source image.

Color in image to color in cursor defaults: Black (0, 0, 0) —> Black White (255, 255, 255) —> White Cyan (0, 255, 255) —> Xor (only available on certain systems) Any Other Color ——> Transparent

get_cell_coordinates(rect, point, size)

Find the cell of size, within rect, that point occupies.

```
get_rendered(font, text, color, cache)
```

Simple font renderer that caches render.

```
load_all_fonts(directory, accept=('.ttf'))
```

Create a dictionary of paths to font files in given directory if their extensions are in accept.

```
\begin{aligned} &\textbf{load\_all\_gfx}(\textit{directory}, \, \textit{colorkey} = \texttt{(255, 0, 255)}, \, \textit{accept} = \texttt{('.png', '.jpg', '.bmp')}) \end{aligned}
```

Load all graphics with extensions in the accept argument. If alpha transparency is found in the image the image will be converted using convert_alpha(). If no alpha transparency is detected image will be converted using convert() and colorkey will be set to colorkey.

 $\mathbf{load_all_music}(\mathit{directory},\,\mathit{accept} = (\texttt{'.wav', '.mp3', '.ogg', '.mdi'}))$

Create a dictionary of paths to music files in given directory if their extensions are in accept.

load_all_sfx(directory, accept=('.wav', '.mp3', '.ogg', '.mdi'))

Load all sfx of extensions found in accept. Unfortunately it is common to need to set sfx volume on a one-by-one basis. This must be done manually if necessary.

$rect_then_mask(one, two)$

This is a callback function to be used with sprite group collision methods. It initially checks if two sprites have overlapping rectangles. If this is True, it will check if their masks collide and return the result. If the rectangles were not colliding, the mask check is not performed.

strip_coords_from_sheet(sheet, coords, size)

Strip specific coordinates from a sprite sheet.

strip_from_sheet(sheet, start, size, columns, rows=1)

Strips individual frames from a sprite sheet given a start location, sprite size, and number of columns and rows.

35.2 Variables

Name	Description
TIME_PER_UPDATE	Value: 16.0
package	Value: 'pygame-asteroids'

35.3 Class Anim

object — pygame-asteroids.tools.Anim

A class to simplify the act of adding animations to sprites.

35.3.1 Methods

 $_$ init $_$ (self, frames, fps, loops=-1)

The argument frames is a list of frames in the correct order; fps is the frames per second of the animation; loops is the number of times the animation will loop (a value of -1 will loop indefinitely).

Overrides: object.__init__

get_next_frame(self, now)

Advance the frame if enough time has elapsed and the animation has not finished looping.

 $\mathbf{reset}(self)$

Set frame, timer, and loop status back to the initialized state.

Inherited from object

35.3.2 Properties

Name	Description
Inherited from object	
class	

35.4 Class Control

object —

pygame-asteroids.tools.Control

Control class for entire project. Contains the game loop, and contains the event_loop which passes events to States as needed.

35.4.1 Methods

 $_$ init $_$ (self, caption, fps=60.0)

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object._init_ extit(inherited documentation)

draw(self, interpolate)

$event_loop(self)$

Process all events and pass them down to the state_machine. The f5 key globally turns on/off the display of FPS in the caption

main(self)

Main loop for entire program. Uses a constant timestep.

$show_fps(self)$

Display the current FPS in the window handle if fps_visible is True.

$\mathbf{toggle_show_fps}(\mathit{self}, \mathit{key})$

Press f5 to turn on/off displaying the framerate in the caption.

update(self)

Updates the currently active state.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

35.4.2 Properties

Name	Description
Inherited from object	
class	

35.5 Class StateMachine

object —

pygame-asteroids.state_machine.StateMachine

Construtor.

35.5.1 Methods

 $_$ init $_$ (self)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self, surface, interpolate)

 $flip_state(self)$

When a State changes to done necessary startup and cleanup functions are called and the current State is changed.

get_event(self, event)

Pass events down to current State.

setup_states(self, state_dict, start_state)

Given a dictionary of states and a state to start in, creates the self.state_dict.

update(self, keys, now)

Checks if a state is done or has called for a game quit. State is flipped if neccessary and State.update is called.

Inherited from object

__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()

35.5.2 Properties

Name	Description
Inherited from object	
class	

continued on next page

me Description

35.6 Class Timer

object —

pygame-asteroids.tools.Timer

A very simple timer for events that are not directly tied to animation.

35.6.1 Methods

__init__(self, delay, ticks=-1)

The delay is given in milliseconds; ticks is the number of ticks the timer will make before flipping self.done to True. Pass a value of -1 to bypass this.

Overrides: object.__init__

check_tick(self, now)

Returns true if a tick worth of time has passed.

Inherited from object

35.6.2 Properties

Name	Description
Inherited from object	
_class	

36 Module pygame-asteroids.touch_buttons

36.1 Variables

Name	Description
RLIMIT_AS	Value: 5
RLIMIT_CORE	Value: 4
RLIMIT_CPU	Value: 0
RLIMIT_DATA	Value: 2
RLIMIT_FSIZE	Value: 1
RLIMIT_MEMLOCK	Value: 6
RLIMIT_NOFILE	Value: 8
RLIMIT_NPROC	Value: 7
RLIMIT_RSS	Value: 5
RLIMIT_STACK	Value: 3
RLIM_INFINITY	Value: 9223372036854775807
RUSAGE_CHILDREN	Value: -1
RUSAGE_SELF	Value: 0
package	Value: 'pygame-asteroids'

36.2 Class TouchButtons

36.2.1 Methods

__init__(self, screen, button_width=40)

create_touch_buttons(self, button_width)

draw(self)

detect_actions(self, event, actions)

37 Module pygame-asteroids.virtual_controller

37.1 Functions

is_event_type_an_input_down(event)

decode_joystick_arrow_to_keyboard_key(joystick)

 $vc_get_angle(center, pos)$

Parameters

pos: posição do mouse

Return Value

ângulo em raidanos da posição do mouse em relação ao centro informado. Controle Virtual é dividido em três partes. Para o eixo-y : 1) above the center of the controller 2) below the center of the controller 3) at the same height of the center of the controller If the mouse point is above the center of the controller, than check for one of three conditions: 1) x is to the right of the controller 2) x is to the left of the controller 3) x is at the same point as the centerx of the controller

37.2 Variables

Name	Description
package	Value: 'pygame-asteroids'

38 Module pygame-asteroids.virtual_keyboard

38.1 Variables

Name	Description
package	Value: 'pygame-asteroids'

38.2 Class TextInput

object —

pygame-asteroids.virtual_keyboard.TextInput

Handles the text input box and manages the cursor

38.2.1 Methods

 $_$ init $_$ (self, background, screen, font, text, x, y)

x.__init__(...) initializes x; see help(type(x)) for signature Overrides: object.__init__ extit(inherited documentation)

 $\overline{\mathbf{draw}(self)}$

Draw the text input box

 ${\bf flashcursor}(\mathit{self})$

Toggle visibility of the cursor

addcharatcursor(self, letter)

Add a character whereever the cursor is currently located

 $\mathbf{backspace}(\mathit{self})$

Delete a character before the cursor position

 $\frac{\mathbf{deccursor}(self)}{\mathbf{deccursor}(self)}$

Move the cursor one space left

inccursor(self)

Move the cursor one space right (but not beyond the end of the text)

drawcursor(self)

Draw the cursor

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

38.2.2 Properties

Name	Description
Inherited from object	
class	

38.3 Class VirtualKey

object —

pygame-asteroids.virtual_keyboard.VirtualKey

A single key for the VirtualKeyboard

38.3.1 Methods

 $_$ init $_$ (self, caption, x, y, w=67, h=67)

x.__init__(...) initializes x; see help(type(x)) for signature

Overrides: object._init_ extit(inherited documentation)

 $\mathbf{draw}(\mathit{self}, \mathit{screen}, \mathit{background}, \mathit{shifted} = \mathtt{False}, \mathit{forcedraw} = \mathtt{False})$

Draw one key if it needs redrawing

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

38.3.2 Properties

Name	Description
Inherited from object	
_class	

38.4 Class VirtualKeyboard

object —

pygame-asteroids.virtual_keyboard.VirtualKeyboard

Implement a basic full screen virtual keyboard for touchscreens

38.4.1 Methods

 $\mathbf{run}(\mathit{self}, \mathit{screen}, \mathit{font}, \mathit{text} \texttt{="'}, \mathit{callback} \texttt{=} \texttt{None})$

not_null(*self*, *text*)

unselectall(self, force=False)

Force all the keys to be unselected Marks any that change as dirty to redraw

clickatmouse(self)

Check to see if the user is pressing down on a key and draw it selected

$\mathbf{togglecaps}(self)$

Toggle uppercase / lowercase

selectatmouse(self)

User has clicked a key, let's use it

addkeys(self)

Adds the setup for the keys. This would be easy to modify for additional keys

The default start position places the keyboard slightly left of center by design so many people have issues with the right side of their touchscreens that I did this on purpose.

paintkeys(self)

Draw the keyboard (but only if they're dirty.)

$\mathbf{clear}(\mathit{self})$

Put the screen back to before we started

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __init__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __sizeof__(), __str__(), __subclasshook__()
```

38.4.2 Properties

Name	Description
Inherited from object	
class	

39 Module random

Random variable generators.

```
integers
      uniform within range
sequences
      pick random element
      pick random sample
      generate random permutation
distributions on the real line:
      uniform
      triangular
      normal (Gaussian)
      lognormal
      negative exponential
      gamma
      beta
      pareto
      Weibull
distributions on the circle (angles 0 to 2pi)
______
      circular uniform
      von Mises
```

General notes on the underlying Mersenne Twister core generator:

- * The period is 2**19937-1.
- * It is one of the most extensively tested generators in existence.
- * Without a direct way to compute N steps forward, the semantics of jumpahead(n) are weakened to simply jump to another distant state and rely on the large period to avoid overlapping sequences.
- * The random() method is implemented in C, executes in a single Python step, and is, therefore, threadsafe.

Functions Module random

39.1 Functions

betavariate(alpha, beta)

Beta distribution.

Conditions on the parameters are alpha > 0 and beta > 0. Returned values range between 0 and 1.

choice(seq)

Choose a random element from a non-empty sequence.

expovariate(lambd)

Exponential distribution.

lambd is 1.0 divided by the desired mean. It should be nonzero. (The parameter would be called "lambda", but that is a reserved word in Python.) Returned values range from 0 to positive infinity if lambd is positive, and from negative infinity to 0 if lambd is negative.

gammavariate(alpha, beta)

Gamma distribution. Not the gamma function!

Conditions on the parameters are alpha > 0 and beta > 0.

The probability distribution function is:

```
x ** (alpha - 1) * math.exp(-x / beta)
pdf(x) = ------
math.gamma(alpha) * beta ** alpha
```

gauss(mu, sigma)

Gaussian distribution.

mu is the mean, and sigma is the standard deviation. This is slightly faster than the normalvariate() function.

Not thread-safe without a lock around calls.

Functions Module random

getrandbits(k)

Generates a long int with k random bits.

Return Value

Χ

getstate()

Return internal state; can be passed to setstate() later.

jumpahead(n)

Change the internal state to one that is likely far away from the current state. This method will not be in Py3.x, so it is better to simply reseed.

lognormvariate(mu, sigma)

Log normal distribution.

If you take the natural logarithm of this distribution, you'll get a normal distribution with mean mu and standard deviation sigma. mu can have any value, and sigma must be greater than zero.

normalvariate(mu, sigma)

Normal distribution.

mu is the mean, and sigma is the standard deviation.

paretovariate(alpha)

Pareto distribution. alpha is the shape parameter.

$\mathbf{randint}(a, b)$

Return random integer in range [a, b], including both end points.

random()

Return Value

x in the interval [0, 1).

Functions Module random

 $randrange(start, stop=None, step=1, _int=<type 'int'>, _maxwidth=9007199254740992)$

Choose a random item from range(start, stop[, step]).

This fixes the problem with randint() which includes the endpoint; in Python this is usually not what you want.

$\mathbf{sample}(population, k)$

Chooses k unique random elements from a population sequence.

Returns a new list containing elements from the population while leaving the original population unchanged. The resulting list is in selection order so that all sub-slices will also be valid random samples. This allows raffle winners (the sample) to be partitioned into grand prize and second place winners (the subslices).

Members of the population need not be hashable or unique. If the population contains repeats, then each occurrence is a possible selection in the sample.

To choose a sample in a range of integers, use xrange as an argument. This is especially fast and space efficient for sampling from a large population: sample(xrange(10000000), 60)

seed(a=None)

Initialize internal state from hashable object.

None or no argument seeds from current time or from an operating system specific randomness source if available.

If a is not None or an int or long, hash(a) is used instead.

setstate(state)

Restore internal state from object returned by getstate().

$\mathbf{shuffle}(x, random = \mathbf{None})$

x, random=random.random -> shuffle list x in place; return None.

Optional arg random is a 0-argument function returning a random float in [0.0, 1.0); by default, the standard random.random.

```
triangular(low=0.0, high=1.0, mode=None)
```

Triangular distribution.

Continuous distribution bounded by given lower and upper limits, and having a given mode value in-between.

http://en.wikipedia.org/wiki/Triangular_distribution

```
\mathbf{uniform}(a, b)
```

Get a random number in the range [a, b) or [a, b] depending on rounding.

vonmisesvariate(mu, kappa)

Circular data distribution.

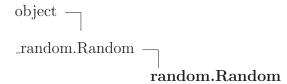
mu is the mean angle, expressed in radians between 0 and 2*pi, and kappa is the concentration parameter, which must be greater than or equal to zero. If kappa is equal to zero, this distribution reduces to a uniform random angle over the range 0 to 2*pi.

weibullvariate(alpha, beta)

Weibull distribution.

alpha is the scale parameter and beta is the shape parameter.

39.2 Class Random



Known Subclasses: random.SystemRandom, random.WichmannHill

Random number generator base class used by bound module functions.

Used to instantiate instances of Random to get generators that don't share state. Especially useful for multi-threaded programs, creating a different instance of Random for each thread, and using the jumpahead() method to ensure that the generated sequences seen by each thread don't overlap.

Class Random can also be subclassed if you want to use a different basic generator of your own devising: in that case, override the following methods: random(), seed(), getstate(), set-

state() and jumpahead(). Optionally, implement a getrandbits() method so that randrange() can cover arbitrarily large ranges.

39.2.1 Methods

 $_$ getstate $_(self)$

 $_$ init $_$ (self, x =None)

Initialize an instance.

Optional argument x controls seeding, as for Random.seed().

Overrides: object.__init__

 $_$ reduce $_$ (self)

helper for pickle

Overrides: object._reduce_ extit(inherited documentation)

 $_{-}$ **setstate** $_{-}$ (self, state)

betavariate(self, alpha, beta)

Beta distribution.

Conditions on the parameters are alpha > 0 and beta > 0. Returned values range between 0 and 1.

choice(self, seq)

Choose a random element from a non-empty sequence.

expovariate(self, lambd)

Exponential distribution.

lambd is 1.0 divided by the desired mean. It should be nonzero. (The parameter would be called "lambda", but that is a reserved word in Python.) Returned values range from 0 to positive infinity if lambd is positive, and from negative infinity to 0 if lambd is negative.

gammavariate(self, alpha, beta)

Gamma distribution. Not the gamma function!

Conditions on the parameters are alpha > 0 and beta > 0.

The probability distribution function is:

gauss(self, mu, sigma)

Gaussian distribution.

mu is the mean, and sigma is the standard deviation. This is slightly faster than the normalvariate() function.

Not thread-safe without a lock around calls.

getstate(self)

Return internal state; can be passed to setstate() later.

Return Value

tuple containing the current state.

Overrides: _random.Random.getstate

jumpahead(self, n)

Change the internal state to one that is likely far away from the current state. This method will not be in Py3.x, so it is better to simply reseed.

Return Value

None

Overrides: _random.Random.jumpahead

lognormvariate(self, mu, sigma)

Log normal distribution.

If you take the natural logarithm of this distribution, you'll get a normal distribution with mean mu and standard deviation sigma. mu can have any value, and sigma must be greater than zero.

normalvariate(self, mu, sigma)

Normal distribution.

mu is the mean, and sigma is the standard deviation.

paretovariate(self, alpha)

Pareto distribution. alpha is the shape parameter.

$\mathbf{randint}(self, a, b)$

Return random integer in range [a, b], including both end points.

 $randrange(self, start, stop=None, step=1, _int=< type 'int'>, _maxwidth=9007199254740992)$

Choose a random item from range(start, stop[, step]).

This fixes the problem with randint() which includes the endpoint; in Python this is usually not what you want.

$\mathbf{sample}(\mathit{self}, \mathit{population}, k)$

Chooses k unique random elements from a population sequence.

Returns a new list containing elements from the population while leaving the original population unchanged. The resulting list is in selection order so that all sub-slices will also be valid random samples. This allows raffle winners (the sample) to be partitioned into grand prize and second place winners (the subslices).

Members of the population need not be hashable or unique. If the population contains repeats, then each occurrence is a possible selection in the sample.

To choose a sample in a range of integers, use xrange as an argument. This is especially fast and space efficient for sampling from a large population: sample(xrange(10000000), 60)

seed(self, a=None)

Initialize internal state from hashable object.

None or no argument seeds from current time or from an operating system specific randomness source if available.

If a is not None or an int or long, hash(a) is used instead.

Return Value

None

Overrides: _random.Random.seed

setstate(self, state)

Restore internal state from object returned by getstate().

Return Value

None

Overrides: _random.Random.setstate

shuffle(self, x, random=None)

x, random=random.random -> shuffle list x in place; return None.

Optional arg random is a 0-argument function returning a random float in $[0.0,\,1.0)$; by default, the standard random.random.

triangular(self, low=0.0, high=1.0, mode=None)

Triangular distribution.

Continuous distribution bounded by given lower and upper limits, and having a given mode value in-between.

http://en.wikipedia.org/wiki/Triangular_distribution

uniform(self, a, b)

Get a random number in the range [a, b) or [a, b] depending on rounding.

Class SystemRandom Module random

vonmisesvariate(self, mu, kappa)

Circular data distribution.

mu is the mean angle, expressed in radians between 0 and 2*pi, and kappa is the concentration parameter, which must be greater than or equal to zero. If kappa is equal to zero, this distribution reduces to a uniform random angle over the range 0 to 2*pi.

weibullvariate(self, alpha, beta)

Weibull distribution.

alpha is the scale parameter and beta is the shape parameter.

$Inherited\ from\ _random.Random$

```
__getattribute__(), __new__(), getrandbits(), random()
```

Inherited from object

```
__delattr__(), __format__(), __hash__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

39.2.2 Properties

Name	Description
Inherited from object	
_class	

39.2.3 Class Variables

Name	Description
VERSION	Value: 3

39.3 Class SystemRandom

```
object —
_random.Random —
_random.Random —
_random.SystemRandom
```

Class SystemRandom Module random

Alternate random number generator using sources provided by the operating system (such as /dev/urandom on Unix or CryptGenRandom on Windows).

Not available on all systems (see os.urandom() for details).

39.3.1 Methods

getrandbits(k)

Generates a long int with k random bits.

Return Value

Χ

Overrides: _random.Random.getrandbits

getstate(self, *args, **kwds)

Method should not be called for a system random number generator.

Return Value

None

Overrides: _random.Random.getstate

jumpahead(self, *args, **kwds)

Stub method. Not used for a system random number generator.

Return Value

None

Overrides: _random.Random.jumpahead

random(self)

Get the next random number in the range [0.0, 1.0).

Return Value

x in the interval [0, 1).

Overrides: _random.Random.random

$\mathbf{seed}(\mathit{self}, *\mathit{args}, **\overline{\mathit{kwds}})$

Stub method. Not used for a system random number generator.

Return Value

None

Overrides: _random.Random.seed

Class SystemRandom Module random

setstate(self, *args, **kwds)

Method should not be called for a system random number generator.

Return Value

None

Overrides: _random.Random.setstate

Inherited from random.Random(Section 39.2)

__getstate__(), __init__(), __reduce__(), __setstate__(), betavariate(), choice(), expovariate(), gammavariate(), gauss(), lognormvariate(), normalvariate(), paretovariate(), randint(), randrange(), sample(), shuffle(), triangular(), uniform(), vonmisesvariate(), weibullvariate()

$Inherited\ from\ _random.Random$

Inherited from object

39.3.2 Properties

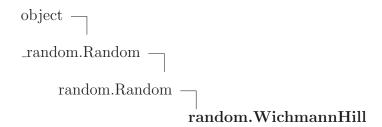
Name	Description
Inherited from object	
class	

39.3.3 Class Variables

Name	Description
Inherited from random.Random (Section 39.2)	
VERSION	

Class WichmannHill Module random

39.4 Class WichmannHill



39.4.1 Methods

getstate(self)

Return internal state; can be passed to setstate() later.

Return Value

tuple containing the current state.

Overrides: _random.Random.getstate

$\mathbf{jumpahead}(\mathit{self}, n)$

Act as if n calls to random() were made, but quickly.

n is an int, greater than or equal to 0.

Example use: If you have 2 threads and know that each will consume no more than a million random numbers, create two Random objects r1 and r2, then do

r2.setstate(r1.getstate())

r2.jumpahead(1000000)

Then r1 and r2 will use guaranteed-disjoint segments of the full period.

Return Value

None

Overrides: _random.Random.jumpahead

random(self)

Get the next random number in the range [0.0, 1.0).

Return Value

x in the interval [0, 1).

Overrides: _random.Random.random

Class WichmannHill Module random

seed(self, a=None)

Initialize internal state from hashable object.

None or no argument seeds from current time or from an operating system specific randomness source if available.

If a is not None or an int or long, hash(a) is used instead.

If a is an int or long, a is used directly. Distinct values between 0 and 27814431486575L inclusive are guaranteed to yield distinct internal states (this guarantee is specific to the default Wichmann-Hill generator).

Return Value

None

Overrides: _random.Random.seed

setstate(self, state)

Restore internal state from object returned by getstate().

Return Value

None

Overrides: _random.Random.setstate

whseed(self, a=None)

Seed from hashable object's hash code.

None or no argument seeds from current time. It is not guaranteed that objects with distinct hash codes lead to distinct internal states.

This is obsolete, provided for compatibility with the seed routine used prior to Python 2.1. Use the .seed() method instead.

Inherited from random.Random(Section 39.2)

__getstate__(), __init__(), __reduce__(), __setstate__(), betavariate(), choice(), expovariate(), gammavariate(), gauss(), lognormvariate(), normalvariate(), paretovariate(), randint(), randrange(), sample(), shuffle(), triangular(), uniform(), vonmisesvariate(), weibullvariate()

$Inherited\ from\ _random.Random$

```
__getattribute__(), __new__(), getrandbits()
```

Inherited from object

```
__delattr__(), __format__(), __hash__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(),
```

Class WichmannHill Module random

$$_{\rm str}(), _{\rm subclasshook}()$$

39.4.2 Properties

Name	Description
Inherited from object	
class	

39.4.3 Class Variables

Name	Description
VERSION	Value: 1

Class StateMachine Module state_machine

40 Module state_machine

Generalização de uma máquina de estado. Utilizada para gerenciar o fluxo do programa

40.1 Variables

Name	Description
package	Value: None

40.2 Class StateMachine

object — state_machine.StateMachine

Construtor.

40.2.1 Methods

 $_$ init $_$ (self)

 $x._init_(...)$ initializes x; see help(type(x)) for signature

Overrides: object.__init__ extit(inherited documentation)

draw(self, surface, interpolate)

flip_state(self)

When a State changes to done necessary startup and cleanup functions are called and the current State is changed.

get_event(self, event)

Pass events down to current State.

setup_states(self, state_dict, start_state)

Given a dictionary of states and a state to start in, creates the self.state_dict.

Class StateMachine Module state_machine

update(self, keys, now)

Checks if a state is done or has called for a game quit. State is flipped if neccessary and State.update is called.

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __hash__(), __new__(), __reduce__(), __reduce_ex__(), __repr__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

40.2.2 Properties

Name	Description
Inherited from object	
_class	

41 Module sys

This module provides access to some objects used or maintained by the interpreter and to functions that interact strongly with the interpreter.

Dynamic objects:

argv -- command line arguments; argv[0] is the script pathname if known
path -- module search path; path[0] is the script directory, else ''
modules -- dictionary of loaded modules

displayhook -- called to show results in an interactive session excepthook -- called to handle any uncaught exception other than SystemExit To customize printing in an interactive session or to install a custom top-level exception handler, assign other functions to replace these.

exitfunc -- if sys.exitfunc exists, this routine is called when Python exits Assigning to sys.exitfunc is deprecated; use the atexit module instead.

stdin -- standard input file object; used by raw_input() and input()
stdout -- standard output file object; used by the print statement
stderr -- standard error object; used for error messages
By assigning other file objects (or objects that behave like files)
to these, it is possible to redirect all of the interpreter's I/O.

last_type -- type of last uncaught exception
last_value -- value of last uncaught exception
last_traceback -- traceback of last uncaught exception
 These three are only available in an interactive session after a traceback has been printed.

exc_type -- type of exception currently being handled
exc_value -- value of exception currently being handled
exc_traceback -- traceback of exception currently being handled
The function exc_info() should be used instead of these three,
because it is thread-safe.

Static objects:

float_info -- a dict with information about the float inplementation.
long_info -- a struct sequence with information about the long implementation.
maxint -- the largest supported integer (the smallest is -maxint-1)
maxsize -- the largest supported length of containers.
maxunicode -- the largest supported character

```
builtin_module_names -- tuple of module names built into this interpreter version -- the version of this interpreter as a string version_info -- version information as a named tuple hexversion -- version information encoded as a single integer copyright -- copyright notice pertaining to this interpreter platform -- platform identifier executable -- absolute path of the executable binary of the Python interpreter prefix -- prefix used to find the Python library exec_prefix -- prefix used to find the machine-specific Python library float_repr_style -- string indicating the style of repr() output for floats __stdin__ -- the original stdin; don't touch! __stderr__ -- the original stderr; don't touch! __stderr__ -- the original stderr; don't touch! __displayhook__ -- the original displayhook; don't touch! __excepthook__ -- the original excepthook; don't touch!
```

Functions:

displayhook() -- print an object to the screen, and save it in __builtin__._ excepthook() -- print an exception and its traceback to sys.stderr exc_info() -- return thread-safe information about the current exception exc_clear() -- clear the exception state for the current thread exit() -- exit the interpreter by raising SystemExit getdlopenflags() -- returns flags to be used for dlopen() calls getprofile() -- get the global profiling function getrefcount() -- return the reference count for an object (plus one :-) getrecursionlimit() -- return the max recursion depth for the interpreter getsizeof() -- return the size of an object in bytes gettrace() -- get the global debug tracing function setcheckinterval() -- control how often the interpreter checks for events setdlopenflags() -- set the flags to be used for dlopen() calls setprofile() -- set the global profiling function setrecursionlimit() -- set the max recursion depth for the interpreter settrace() -- set the global debug tracing function

41.1 Functions

__displayhook__(object)
Print an object to sys.stdout and also save it in __builtin__._
Return Value
None

__excepthook__(exctype, value, traceback)

Handle an exception by displaying it with a traceback on sys.stderr.

Return Value

None

call_tracing(func, arqs)

Call func(*args), while tracing is enabled. The tracing state is saved, and restored afterwards. This is intended to be called from a debugger from a checkpoint, to recursively debug some other code.

Return Value

object

callstats()

Return a tuple of function call statistics, if CALL_PROFILE was defined when Python was built. Otherwise, return None.

When enabled, this function returns detailed, implementation-specific details about the number of function calls executed. The return value is a 11-tuple where the entries in the tuple are counts of:

- 0. all function calls
- 1. calls to PyFunction_Type objects
- 2. PyFunction calls that do not create an argument tuple
- 3. PyFunction calls that do not create an argument tuple
 and bypass PyEval_EvalCodeEx()
- 4. PyMethod calls
- 5. PyMethod calls on bound methods
- 6. PyType calls
- 7. PyCFunction calls
- 8. generator calls
- 9. All other calls
- 10. Number of stack pops performed by call_function()

Return Value

tuple of integers

displayhook(object)

Print an object to sys.stdout and also save it in _builtin_..

Return Value

None

exc_clear()

Clear global information on the current exception. Subsequent calls to exc_info() will return (None,None,None) until another exception is raised in the current thread or the execution stack returns to a frame where another exception is being handled.

Return Value

None

exc_info()

Return information about the most recent exception caught by an except clause in the current stack frame or in an older stack frame.

Return Value

(type, value, traceback)

excepthook(exctype, value, traceback)

Handle an exception by displaying it with a traceback on sys.stderr.

Return Value

None

$\mathbf{exit}(status = \dots)$

Exit the interpreter by raising SystemExit(status). If the status is omitted or None, it defaults to zero (i.e., success). If the status is an integer, it will be used as the system exit status. If it is another kind of object, it will be printed and the system exit status will be one (i.e., failure).

getcheckinterval()

Return Value

current check interval; see setcheckinterval().

getdefaultencoding()

Return the current default string encoding used by the Unicode implementation.

Return Value

string

getdlopenflags()

Return the current value of the flags that are used for dlopen calls. The flag constants are defined in the ctypes and DLFCN modules.

Return Value

int

getfilesystemencoding()

Return the encoding used to convert Unicode filenames in operating system filenames.

Return Value

string

getprofile()

Return the profiling function set with sys.setprofile. See the profiler chapter in the library manual.

getrecursionlimit()

Return the current value of the recursion limit, the maximum depth of the Python interpreter stack. This limit prevents infinite recursion from causing an overflow of the C stack and crashing Python.

getrefcount(object)

Return the reference count of object. The count returned is generally one higher than you might expect, because it includes the (temporary) reference as an argument to getrefcount().

Return Value

integer

getsizeof(object, default)

Return the size of object in bytes.

Return Value

int

gettrace()

Return the global debug tracing function set with sys.settrace. See the debugger chapter in the library manual.

Variables Module sys

setcheckinterval(n)

Tell the Python interpreter to check for asynchronous events every n instructions. This also affects how often thread switches occur.

setdlopenflags(n)

Set the flags used by the interpreter for dlopen calls, such as when the interpreter loads extension modules. Among other things, this will enable a lazy resolving of symbols when importing a module, if called as sys.setdlopenflags(0). To share symbols across extension modules, call as sys.setdlopenflags(ctypes.RTLD_GLOBAL). Symbolic names for the flag modules can be either found in the ctypes module, or in the DLFCN module. If DLFCN is not available, it can be generated from /usr/include/dlfcn.h using the h2py script.

Return Value

None

setprofile(function)

Set the profiling function. It will be called on each function call and return. See the profiler chapter in the library manual.

setrecursion limit(n)

Set the maximum depth of the Python interpreter stack to n. This limit prevents infinite recursion from causing an overflow of the C stack and crashing Python. The highest possible limit is platform- dependent.

settrace(function)

Set the global debug tracing function. It will be called on each function call. See the debugger chapter in the library manual.

41.2 Variables

Name	Description
package	Value: None
stderr	Value: <open '<stderr="" file="">', mode 'w'</open>
	at 0x1002931e0>
stdin	Value: <open '<stdin="" file="">', mode 'r'</open>
	at 0x1002930c0>
stdout	Value: <open '<stdout="" file="">', mode 'w'</open>
	at 0x100293150>
api_version	Value: 1013

continued on next page

Variables Module sys

Name	Description
argv	Value:
	['/Library/Frameworks/Python.framework/Versions/2.7/bin/e.
builtin_module_names	Value: ('builtin', 'main', '_ast',
	'_codecs', '_sre', '
byteorder	Value: 'little'
copyright	Value: 'Copyright (c) 2001-2014 Python
	Software Foundation.\nAll
dont_write_bytecode	Value: False
exc_type	Value: None
exec_prefix	Value:
	'/Library/Frameworks/Python.framework/Versions/2.7'
executable	Value:
	'/Library/Frameworks/Python.framework/Versions/2.7/Resour.
flags	Value: sys.flags(debug=0,
	py3k_warning=0, division_warning=0,
	di
float_info	Value:
	sys.float_info(max=1.7976931348623157e+308,
	max_exp=1024,
float_repr_style	Value: 'short'
hexversion	Value: 34015728
long_info	Value: sys.long_info(bits_per_digit=30,
	sizeof_digit=4)
maxint	Value: 9223372036854775807
maxsize	Value: 9223372036854775807
maxunicode	Value: 65535
meta_path	Value: []
modules	Value: {'ConfigParser': <module< td=""></module<>
	'ConfigParser' from '/Library/Fr
path	Value: ['/Users/tux/git',
	'/Library/Frameworks/Python.framework/
path_hooks	Value: [<type 'zipimport.zipimporter'="">]</type>
path_importer_cache	Value: {'': None,
	'/Library/Frameworks/Python.framework/Versions
platform	Value: 'darwin'
prefix	Value:
	'/Library/Frameworks/Python.framework/Versions/2.7'
py3kwarning	Value: False
stderr	Value: <open '<stderr="" file="">', mode 'w'</open>
	at 0x1002931e0>
stdin	Value: <open '<stdin="" file="">', mode 'r'</open>
	at 0x1002930c0>

 $continued\ on\ next\ page$

Variables Module sys

Name	Description
stdout	Value: <open '<stdout="" file="">', mode 'w'</open>
	at 0x100293150>
subversion	Value: ('CPython', '', '')
version	Value: '2.7.9 (v2.7.9:648dcafa7e5f, Dec
	10 2014, 10:10:46) \n[GC
version_info	Value: sys.version_info(major=2,
	minor=7, micro=9, releaselevel=
warnoptions	Value: []

42 Module time

This module provides various functions to manipulate time values.

There are two standard representations of time. One is the number of seconds since the Epoch, in UTC (a.k.a. GMT). It may be an integer or a floating point number (to represent fractions of seconds). The Epoch is system-defined; on Unix, it is generally January 1st, 1970. The actual value can be retrieved by calling gmtime(0).

```
The other representation is a tuple of 9 integers giving local time.
The tuple items are:
 year (four digits, e.g. 1998)
 month (1-12)
 day (1-31)
 hours (0-23)
 minutes (0-59)
 seconds (0-59)
 weekday (0-6, Monday is 0)
 Julian day (day in the year, 1-366)
 DST (Daylight Savings Time) flag (-1, 0 or 1)
If the DST flag is 0, the time is given in the regular time zone;
if it is 1, the time is given in the DST time zone;
if it is -1, mktime() should guess based on the date and time.
Variables:
timezone -- difference in seconds between UTC and local standard time
altzone -- difference in seconds between UTC and local DST time
daylight -- whether local time should reflect DST
tzname -- tuple of (standard time zone name, DST time zone name)
```

Functions:

```
time() -- return current time in seconds since the Epoch as a float
clock() -- return CPU time since process start as a float
sleep() -- delay for a number of seconds given as a float
gmtime() -- convert seconds since Epoch to UTC tuple
localtime() -- convert seconds since Epoch to local time tuple
asctime() -- convert time tuple to string
ctime() -- convert time in seconds to string
mktime() -- convert local time tuple to seconds since Epoch
strftime() -- convert time tuple to string according to format specification
strptime() -- parse string to time tuple according to format specification
```

Functions Module time

tzset() -- change the local timezone

42.1 Functions

asctime(tuple=...)

Convert a time tuple to a string, e.g. 'Sat Jun 06 16:26:11 1998'. When the time tuple is not present, current time as returned by localtime() is used.

Return Value

string

clock()

Return the CPU time or real time since the start of the process or since the first call to clock(). This has as much precision as the system records.

Return Value

floating point number

ctime(seconds)

Convert a time in seconds since the Epoch to a string in local time. This is equivalent to asctime(localtime(seconds)). When the time tuple is not present, current time as returned by localtime() is used.

Return Value

string

gmtime(seconds = ...)

tm_sec, tm_wday, tm_yday, tm_isdst)

Convert seconds since the Epoch to a time tuple expressing UTC (a.k.a. GMT). When 'seconds' is not passed in, convert the current time instead.

Return Value

(tm_year, tm_mon, tm_mday, tm_hour, tm_min,

Functions Module time

localtime(seconds = ...)

tm_sec,tm_wday,tm_yday,tm_isdst)

Convert seconds since the Epoch to a time tuple expressing local time. When 'seconds' is not passed in, convert the current time instead.

Return Value

(tm_year,tm_mon,tm_mday,tm_hour,tm_min,

mktime(tuple)

Convert a time tuple in local time to seconds since the Epoch.

Return Value

floating point number

sleep(seconds)

Delay execution for a given number of seconds. The argument may be a floating point number for subsecond precision.

strftime(format, tuple=...)

Convert a time tuple to a string according to a format specification. See the library reference manual for formatting codes. When the time tuple is not present, current time as returned by localtime() is used.

Return Value

string

strptime(string, format)

Parse a string to a time tuple according to a format specification. See the library reference manual for formatting codes (same as strftime()).

Return Value

struct_time

time()

Return the current time in seconds since the Epoch. Fractions of a second may be present if the system clock provides them.

Return Value

floating point number

tzset()

Initialize, or reinitialize, the local timezone to the value stored in os.environ['TZ']. The TZ environment variable should be specified in standard Unix timezone format as documented in the tzset man page (eg. 'US/Eastern', 'Europe/Amsterdam'). Unknown timezones will silently fall back to UTC. If the TZ environment variable is not set, the local timezone is set to the systems best guess of wallclock time. Changing the TZ environment variable without calling tzset *may* change the local timezone used by methods such as localtime, but this behaviour should not be relied on.

42.2 Variables

Name	Description
package	Value: None
accept2dyear	Value: 1
altzone	Value: 7200
daylight	Value: 1
timezone	Value: 10800
tzname	Value: ('BRT', 'BRST')

42.3 Class struct_time



The time value as returned by gmtime(), localtime(), and strptime(), and accepted by asctime(), mktime() and strftime(). May be considered as a sequence of 9 integers.

Note that several fields' values are not the same as those defined by the C language standard for struct tm. For example, the value of the field tm_year is the actual year, not year - 1900. See individual fields' descriptions for details.

42.3.1 Methods

$_$ add $_$ (x, y)	
x+y	

$_$ contains $_$ (x, y)	
y in x	

 $-\mathbf{eq}_{--}(x, y)$ x = = y $-\mathbf{ge}_{-}(x, y)$ x>=y $_{-}$ getitem $_{-}(x, y)$ x[y] $_$ getslice $_(x, i, j)$ x[i:j]Use of negative indices is not supported. $_{-}\mathbf{gt}_{-}(x, y)$ x>y $_{-}\mathbf{hash}_{-}(x)$ hash(x)Overrides: object._hash_ $-\mathbf{le}_{-}(x, y)$ $x \le y$ -len $_-(x)$ len(x) $-1t_{-}(x, y)$ x < y $_{-}$ **mul** $_{-}$ (x, n) x^*n

 $-\mathbf{ne}_{-}(x, y)$

x!=y

```
\_new\_(T, S, ...)
```

Return Value

a new object with type S, a subtype of T

Overrides: object._new__

```
__reduce__(...)
```

helper for pickle

Overrides: object._reduce_ extit(inherited documentation)

```
__repr__(x)
repr(x)
Overrides: object.__repr__
```

```
 \frac{ -\mathbf{rmul}_{--}(x, n) }{ \mathbf{n}^* \mathbf{x} }
```

Inherited from object

```
__delattr__(), __format__(), __getattribute__(), __init__(), __reduce_ex__(), __setattr__(), __sizeof__(), __str__(), __subclasshook__()
```

42.3.2 Properties

Name	Description
tm_hour	hours, range [0, 23]
tm_isdst	1 if summer time is in effect, 0 if not, and -1 if
	unknown
tm_mday	day of month, range [1, 31]
tm_min	minutes, range [0, 59]
tm_mon	month of year, range [1, 12]
tm_sec	seconds, range $[0, 61]$)
tm_wday	day of week, range [0, 6], Monday is 0
tm_yday	day of year, range [1, 366]
tm_year	year, for example, 1993
Inherited from object	
_class	

42.3.3 Class Variables

Name	Description
n_fields	Value: 9
n_sequence_fields	Value: 9
n_unnamed_fields	Value: 0

Index

codecs (module), 2–4 codecs.EncodedFile (function), 2 codecs.ignore_errors (function), 2 codecs.lookup (function), 2 codecs.lookup_error (function), 2	math.atan2 (function), 6 math.atanh (function), 6 math.ceil (function), 6 math.copysign (function), 6 math.cos (function), 6
codecs.open (function), 2 codecs.register (function), 3	math.cosh (function), 6 math.degrees (function), 6
codecs.register_error (function), 3	math.erf (function), 7
codecs.replace_errors (function), 3	math.erfc (function), 7
codecs.strict_errors (function), 3	math.exp (function), 7
codecs.xmlcharrefreplace_errors (function), 3	math.expm1 (function), 7
color. Color $(class)$, 153–154, 161–163, 168–	math.fabs (function), 7
169	math.factorial (function), 7
color.Color.color_replace (static method), 153,	math.floor (function), 7
162, 168	math.fmod (function), 7
color.Color.hex_to_rgb (static method), 153,	math.frexp (function), 7
162, 168 color.Color.random_color (static method), 153,	math.fsum (function), 7 math.gamma (function), 7
162, 168	math.hypot (function), 7
color.Color.rgb_to_hex (static method), 153,	math.isinf (function), 8
162, 168	math.isnan (function), 8
credit (module), 5	math.ldexp (function), 8
credit.credit (function), 5	math.lgamma (function), 8
credit_from_file (function), 5	math.log (function), 8
exceptions.OSError (class), 28–29	math.log10 (function), 8 math.log1p (function), 8
font.Font (class), 154, 163, 169	math.modf (function), 8
	math.pow (function), 8
generic path.commonprefix (function), 47	math.radians (function), 8
genericpath.exists (function), 47	math.sin (function), 8
genericpath.getatime (function), 47	math.sinh (function), 8
genericpath.getctime (function), 47	math.sqrt (function), 9
genericpath.getmtime (function), 48	math.tan (function), 9
generic path. getsize (function), 48	math.tanh (function), 9 math.trunc (function), 9
genericpath.isdir (function), 48 genericpath.isfile (function), 48	math.trune (janetion), 9
generic patificisme (junction), 40	operator.itemgetter $(class)$, 136–137, 157–158
math (module), 6–9	operator.itemgettercall $(function)$, 136, 157
math.acos (function), 6	os (module), 10–35
math.acosh (function), 6	os.abort (function), 11
math.asin (function), 6	os.access (function), 11
math.asinh (function), 6	os.chdir (function), 11
math.atan (function), 6	os.chflags (function), 11

os.chmod (function), 11 os.chown (function), 11 os.chroot (function), 12 os.close (function), 12 os.closerange (function), 12 os.confstr (function), 12 os.ctermid (function), 12 os.dup (function), 12 os.dup2 (function), 12 os.execl (function), 12 os.execle (function), 12 os.execlp (function), 12 os.execlpe (function), 12 os.execv (function), 13 os.execve (function), 13 os.execvp (function), 13 os.execvpe (function), 13 os.fchdir (function), 13 os.fchmod (function), 13 os.fchown (function), 13 os.fdopen (function), 13 os.fork (function), 13 os.forkpty (function), 14 os.fpathconf (function), 14 os.fstat (function), 14 os.fstatvfs (function), 14 os.fsync (function), 14 os.ftruncate (function), 14 os.getcwd (function), 14 os.getcwdu (function), 14 os.getegid (function), 15 os.getenv (function), 15 os.geteuid (function), 15 os.getgid (function), 15 os.getgroups (function), 15 os.getloadavg (function), 15 os.getlogin (function), 15 os.getpgid (function), 15 os.getpgrp (function), 16 os.getpid (function), 16 os.getppid (function), 16 os.getsid (function), 16 os.getuid (function), 16 os.initgroups (function), 16

os.isatty (function), 16 os.kill (function), 16 os.killpg (function), 17 os.lchflags (function), 17 os.lchmod (function), 17 os.lchown (function), 17 os.link (function), 17 os.listdir (function), 17 os.lseek (function), 17 os.lstat (function), 17 os.major (function), 17 os.makedev (function), 18 os.makedirs (function), 18 os.minor (function), 18 os.mkdir (function), 18 os.mkfifo (function), 18 os.mknod (function), 18 os.nice (function), 18 os.open (function), 18 os. openpty (function), 18 os.pathconf (function), 19 os.pipe (function), 19 os.popen (function), 19 os.popen2 (function), 19 os.popen3 (function), 19 os.popen4 (function), 19 os.putenv (function), 19 os.read (function), 20 os.readlink (function), 20 os.remove (function), 20 os.removedirs (function), 20 os.rename (function), 20 os.renames (function), 20 os.rmdir (function), 20 os.setegid (function), 20 os.seteuid (function), 20 os.setgid (function), 21 os.setgroups (function), 21 os.setpgid (function), 21 os.setpgrp (function), 21 os.setregid (function), 21 os.setreuid (function), 21 os.setsid (function), 21 os.setuid (function), 21

os.spawnl (function), 21	pickle.dumps (fun
os.spawnle (function), 21	pickle.load (funct
os.spawnlp (function), 21	pickle.loads (func
os.spawnlpe (function), 22	pickle.PickleError
os.spawnv (function), 22	pickle.Pickler (cla
os.spawnve (function), 22	pickle.Picklerin
os.spawnvp (function), 22	pickle.Pickler.clea
os.spawnvpe (function), 22	pickle.Pickler.dun
os.stat (function), 23	pickle.Pickler.get
os.stat_float_times (function), 23	pickle.Pickler.mer
os.statvfs (function), 23	pickle.Pickler.pers
os.strerror (function), 23	pickle.Pickler.put
os.symlink (function), 23	pickle.Pickler.save
os.sysconf (function), 23	pickle.Pickler.save
os.system (function), 23	pickle.Pickler.save
os.tcgetpgrp (function), 23	pickle.Pickler.save
os.tcsetpgrp (function), 24	pickle.Pickler.save
os.tempnam (function), 24	pickle.Pickler.save
os.times (function), 24	pickle.Pickler.save
os.tmpfile (function), 24	pickle.Pickler.save
os.tmpnam (function), 24	pickle.Pickler.save
os.ttyname (function), 24	pickle.Pickler.save
os.umask (function), 24	pickle.Pickler.save
os.uname (function), 24	pickle.Pickler.save
os.unlink (function), 25	pickle.Pickler.save
os.unsetenv (function), 25	pickle.Pickler.save
os.urandom (function), 25	pickle.Pickler.save
os.utime (function), 25	pickle.Pickler.save
os.wait (function), 25	pickle.PicklingErr
os.wait3 (function), 25	pickle.Unpickler (
os.wait4 (function), 25	pickle.Unpickler
os.waitpid (function), 25	pickle.Unpickler.fi
os.walk (function), 25	pickle.Unpickler.g
os.WCOREDUMP (function), 10	pickle.Unpickler.le
os.WEXITSTATUS (function), 10	pickle.Unpickler.le
os.WIFCONTINUED (function), 10	pickle.Unpickler.le
os.WIFEXITED (function), 10	pickle.Unpickler.le
os.WIFSIGNALED (function), 10	pickle.Unpickler.le
os.WIFSTOPPED (function), 11	pickle.Unpickler.le
os.write (function), 26	pickle.Unpickler.le
os.WSTOPSIG (function), 11	pickle.Unpickler.le
os.WTERMSIG (function), 11	pickle.Unpickler.le
(100000000), 11	pickle.Unpickler.le
pickle (module), 36–46	pickle.Unpickler.le
pickle.dump (function), 36	promot o inpromot it

nction), 36 tion), 36ction), 36 r (class), 38–39 ass), 39–41 nit_{--} (function), 39 ar_memo (function), 39 mp (function), 39 (function), 39 moize (function), 40 esistent_id (function), 40 t (function), 40 e (function), 40re_bool (function), 40 re_dict (function), 40 re_empty_tuple (function), 40 re_float (function), 40 re_global (function), 40 e_{inst} (function), 40 re_int (function), 40 re_list (function), 40 re_long (function), 40 re_none (function), 40 re_pers (function), 40 re_reduce (function), 40 e_string (function), 40 re_tuple (function), 40 $e_{unicode}$ (function), 41 ror (class), 41–42 (class), 42-45 $_{-init_{--}}$ (function), 42 find_class (function), 42 get_extension (function), 42 load (function), 42 load_append (function), 42 load_appends (function), 42 load_binfloat (function), 42 load_binget (function), 42 load_binint (function), 42 load_binint1 (function), 42 load_binint2 (function), 43 load_binpersid (function), 43 load_binput (function), 43 load_binstring (function), 43

pickle.Unpickler.load_binunicode (function), 43	Spickle.Unpickler.load_tuple (function), 45
pickle.Unpickler.load_build (function), 43	pickle.Unpickler.load_tuple1 (function), 45
pickle.Unpickler.load_dict (function), 43	pickle.Unpickler.load_tuple2 (function), 45
pickle.Unpickler.load_dup (function), 43	pickle.Unpickler.load_tuple3 (function), 45
pickle.Unpickler.load_empty_dictionary (func-	pickle.Unpickler.load_unicode (function), 45
tion), 43	pickle.Unpickler.marker (function), 45
pickle.Unpickler.load_empty_list (function), 43	- (*):
pickle. Unpickler.load_empty_tuple (function),	polygon.Cube (class), 154
43	polygon.Cubeinit (function), 154
pickle.Unpickler.load_eof (function), 43	polygon.Cube.draw (function), 154
pickle.Unpickler.load_ext1 (function), 43	polygon.Point3D (class), 155–156
pickle.Unpickler.load_ext2 (function), 43	polygon.Point3Dinit (function), 156
pickle.Unpickler.load_ext4 (function), 43	polygon.Point3D.project (function), 156
pickle.Unpickler.load_false (function), 43	polygon.Point3D.rotateX (function), 156
pickle.Unpickler.load_float (function), 43	polygon.Point3D.rotateY (function), 156
pickle.Unpickler.load_get (function), 43	polygon.Point3D.rotateZ (function), 156
pickle.Unpickler.load_global (function), 43	posix.stat_result (class), 29–32
pickle.Unpickler.load_inst (function), 43	posix.stat_resultadd (function), 30
pickle.Unpickler.load_int (function), 44	
- ''	posix.stat_resultcontains (function), 30
pickle.Unpickler.load_list (function), 44	posix.stat_resulteq (function), 30
pickle.Unpickler.load_long (function), 44	posix.stat_resultge (function), 30
pickle.Unpickler.load_long1 (function), 44	posix.stat_resultgetitem (function), 30
pickle.Unpickler.load_long4 (function), 44	posix.stat_resultgetslice (function), 30
pickle.Unpickler.load_long_binget (function),	posix.stat_resultgt (function), 30
44	posix.stat_resultle (function), 30
pickle.Unpickler.load_long_binput (function),	posix.stat_resultlen (function), 30
44	posix.stat_resultlt (function), 30
pickle.Unpickler.load_mark (function), 44	posix.stat_resultmul (function), 31
pickle.Unpickler.load_newobj (function), 44	posix.stat_resultne (function), 31
pickle.Unpickler.load_none (function), 44	posix.stat_resultrmul (function), 31
pickle.Unpickler.load_obj (function), 44	posix.statvfs_result (class), 32–35
pickle.Unpickler.load_persid (function), 44	posix.statvfs_resultadd (function), 32
pickle.Unpickler.load_pop (function), 44	posix.statvfs_resultcontains (function), 32
pickle.Unpickler.load_pop_mark (function), 44	posix.statvfs_resulteq (function), 33
pickle.Unpickler.load_proto (function), 44	posix.statvfs_resultge (function), 33
pickle.Unpickler.load_put (function), 44	posix.statvfs_resultgetitem (function), 33
pickle.Unpickler.load_reduce (function), 44	posix.statvfs_resultgetslice (function), 33
pickle.Unpickler.load_setitem (function), 44	posix.statvfs_resultgt (function), 33
pickle.Unpickler.load_setitems (function), 44	posix.statvfs_resultle (function), 33
$pickle. Unpickler. load_short_binstring \ (function$	posix.statvfs_resultlen (function), 33
44	posix.statvfs_resultlt (function), 33
pickle.Unpickler.load_stop (function), 45	posix.statvfs_resultmul (function), 33
pickle.Unpickler.load_string (function), 45	posix.statvfs_resultne (function), 33
pickle.Unpickler.load_true (function), 45	posix.statvfs_resultrmul (function), 34

INDEX INDEX

posixpath (module), 47–50

pygame-asteroids.credit' $(module),\,102$

posixpath.abspath (function), 47	pygame-asteroids.file (module)
posixpath.basename (function), 47	pygame-asteroids.file.FileManager (class),
posixpath.dirname (function), 47	103-104, 111-112, 181-182, 207-208,
posixpath.expanduser (function), 47	235–236
posixpath.expandvars (function), 47	pygame-asteroids.file' (module), 103–104
posixpath.isabs (function), 48	pygame-asteroids.font (module)
posixpath.islink (function), 48	pygame-asteroids.font.Font (class), 105,
posixpath.ismount (function), 48	112, 138, 182, 208, 236
posixpath.join (function), 48	pygame-asteroids.font, (module), 105
posixpath.lexists (function), 48	pygame-asteroids.game (module)
posixpath.normcase (function), 48	pygame-asteroids.game.Game (class), 112–
posixpath.normpath (function), 48	113, 182–183, 208–209, 236–237
posixpath.realpath (function), 49	pygame-asteroids.game.GameController
posixpath.relpath (function), 49	(class), 113–115, 183–185, 209–211
posixpath.samefile (function), 49	pygame-asteroids.game.SpriteGroup (class),
posixpath.sameopenfile (function), 49	119–120, 192–193, 218–219
posixpath.samestat (function), 49	pygame-asteroids.game' (module), 106–128
posixpath.split (function), 49	pygame-asteroids.main (module), 129
posixpath.splitdrive (function), 49	pygame-asteroids.main.main (function),
posixpath.splitext (function), 49	129
posixpath.walk (function), 49	pygame-asteroids.menu_helper (module),
pygame (package), 51–89	130–133
pygame-asteroids (package), 90–91	pygame-asteroids.menu_helper.MainMenu
pygame-asteroids.asteroid (module)	(class), 132–133
pygame-asteroids.asteroid (class),	pygame-asteroids.menu_helper.Menu (class),
92–93, 107–108, 177–178, 203–204, 231–	130–132
232	pygame-asteroids.menu_helper.MenuItem
pygame-asteroids.asteroid' (module), 92–	(class), 130
96	pygame-asteroids.polygon (module)
pygame-asteroids.bullet (module)	pygame-asteroids.polygon.Cube (class),
pygame-asteroids.bullet.Bullet (class), 97–	135
98, 108–110, 178–180, 204–206, 232–	pygame-asteroids.polygon.Point3D (class),
234	135–136
pygame-asteroids.bullet' (module), 97–99	pygame-asteroids.polygon' (module), 134–
pygame-asteroids.color (module), 100–101	137
pygame-asteroids.color.Color (class), 93–	pygame-asteroids.resource_manager (mod-
95, 100–101, 110–111, 134–135, 180–	ule)
181, 206–207, 234–235	pygame-asteroids.resource_manager.ResourceManag
pygame-asteroids.credit (module)	(class), 138–141, 185–188, 211–214,
pygame-asteroids.credit.credit (function),	237–240
102	pygame-asteroids.resource_manager' (mod-
pygame-asteroids.credit.credit_from_file	ule), 138–141
(function), 102	pygame-asteroids.score (module), 142
(10000000), 102	P. 5 Same absorbab. 50010 (1110 auto), 172

INDEX INDEX

103, 111, 142, 181, 207, 235 pygame-asteroids.ship (module), 143–145 pygame-asteroids.ship.Ship (class), 115-117, 143–145, 188–191, 214–217, 240– pygame-asteroids.sprite_collision (module), 146-147(class), 95–96, 98–99, 117–119, 146– 147, 191–192, 217–218, 242–244 pygame-asteroids.start_field (module), 148-149 pygame-asteroids.start_field.StarField (class). 120–121, 148–149, 193–194, 219–220, 228–229, 244–245 pygame-asteroids.state_machine (module) pygame-asteroids.state_machine.StateMachine pygame-asteroids.tools.Control (class), (class), 150–151, 257–259 pygame-asteroids.state_machine' (module), 150-151pygame-asteroids.states (package) pygame-asteroids.states.menu (module), 165 - 166pygame-asteroids.states' (package), 175 pygame-asteroids.states.franchise' (module), 152–160 pygame-asteroids.states.intro' (module), 161 - 164pygame-asteroids.states.seal' (module), 167 - 174pygame-asteroids.test_audio (module) pygame-asteroids.test_audio.main (function), 176 pygame-asteroids.test_audio' (module), 176– 201 pygame-asteroids.test_rotation (module) pygame-asteroids.test_rotation.main (function), 202 pygame-asteroids.test_rotation' (module),

202 - 227

tion), 228

pygame-asteroids.test_startfield (module)

pygame-asteroids.test_startfield.main (func-

pygame-asteroids.score.DataHandler (class), pygame-asteroids.test_startfield' (module), 228 - 229pygame-asteroids.test_touch_buttons (module) pygame-asteroids.test_touch_buttons.main (function), 230 pygame-asteroids.test_touch_buttons' (module), 230–252 pygame-asteroids.sprite_collision.SpriteCollisiongame-asteroids.test_virtual_keyboard (module) pygame-asteroids.test_virtual_keyboard.main (function), 253 pygame-asteroids.test_virtual_keyboard' (module), 253 pygame-asteroids.tools (module) pygame-asteroids.tools.Anim (class), 255– 256256-257pygame-asteroids.tools.cursor_from_image (function), 254 pygame-asteroids.tools.get_cell_coordinates (function), 254 pygame-asteroids.tools.get_rendered (function), 254 pygame-asteroids.tools.load_all_fonts (function), 254 pygame-asteroids.tools.load_all_gfx (function), 254 pygame-asteroids.tools.load_all_music (function), 254 pygame-asteroids.tools.load_all_sfx (function), 255 pygame-asteroids.tools.rect_then_mask (function), 255 pygame-asteroids.tools.strip_coords_from_sheet (function), 255 pygame-asteroids.tools.strip_from_sheet (function), 255 pygame-asteroids.tools.Timer (class), 259 pygame-asteroids.tools' (module), 254–259

pygame-asteroids.touch_buttons (module),

pygame-asteroids.touch_buttons.TouchButtons

260

(class), 122, 195, 221, 246, 260	pygame.Colorfloat (function), 60
pygame-asteroids.virtual_controller (mod-	pygame.Colorfloordiv_ (function), 60
ule), 261	pygame.Colorge (function), 60
pygame-asteroids.virtual_controller.deco	odevigensteckolorowgetitlennboa(funktion), 60
(function), 102, 106, 176, 202, 230,	pygame.Colorgetslice (function), 60
261	pygame.Colorgt (function), 61
pygame-asteroids.virtual_controller.is_ev	- (, , , , , , , , , , , , , , , , , ,
(function), 102, 106, 176, 202, 230,	pygame.Colorindex (function), 61
261	pygame.Colorint (function), 61
pygame-asteroids.virtual_controller.vc_g	
(function), 102, 106, 176, 202, 230,	pygame.Colorle_ (function), 61
261	pygame.Colorlen (function), 61
pygame-asteroids.virtual_keyboard (mod-	pygame.Colorlong (function), 61
ule), 262–265	pygame.Colorlt (function), 61
pygame-asteroids.virtual_keyboard.Text	- 0 0 / 1
(class), 121–122, 194–195, 220–221,	0
245-246, 262-263	pygame.Colorne_ (function), 62
pygame-asteroids.virtual_keyboard.Virtu	
	pygame.Colorradd (function), 62
246-247, 263-264	pygame.Colorrdiv (function), 62
pygame-asteroids.virtual_keyboard.Virtu	ually each of dlorrfloordiv_ (function), 62
	pygame.Colorrmod_ (function), 62
$247-248,\ 264-265$	pygame.Colorrmul (function), 62
pygame-asteroids.states.franchise.Franchise (e	elpssgame.Colorrsub (function), 62
154–155	pygame.Colorsetitem_ (function), 62
pygame-asteroids.states.franchise.Franchise.du	rapygame.Colorsub_ (function), 63
(function), 155	pygame.Color.correct_gamma (function), 63
pygame-asteroids.states.intro.Introduction (cl	apygame.Color.normalize (function), 63
163 – 164	pygame.Color.set_length (function), 63
pygame-asteroids.states.intro.Introduction.dra	awpygame.error (class), 88–89
(function), 163	pygame.Overlay (class), 64–65
pygame-asteroids.states.seal.Seal (class), 169-	pygame. Overlay. display (function), 64
170	pygame.Overlay.get_hardware (function), 64
pygame-asteroids.states.seal.Seal.draw (func-	pygame.Overlay.set_location (function), 64
tion), 170	pygame.packager_imports (function), 51
pygame.BufferError (class), 57–58	pygame.PixelArray (class), 65–67
pygame.BufferProxy (class), 58–59	pygame.PixelArraycontains_ (function), 65
pygame.BufferProxy.write (function), 59	pygame.PixelArraydelitem (function), 65
pygame.Color (class), 59–64	pygame.PixelArraygetitem (function), 65
pygame.Coloradd (function), 60	pygame.PixelArrayiter (function), 65
pygame.Colorcoerce (function), 60	pygame.PixelArraylen (function), 65
pygame.Colordelitem (function), 60	pygame.PixelArraysetitem (function), 66
pygame.Colordiv (function), 60	pygame.PixelArray.compare (function), 66
pygame.Coloreq (function), 60	primary a Direct Amore arthur at (formation) 66
py same. color:eq (jamettom), oo	pygame.PixelArray.extract (function), 66

pygame.PixelArray.make_surface (function), 66pygame.Surface.convert (function), 74, 81 pygame.PixelArray.replace (function), 66 pygame.Surface.convert_alpha (function), 74, pygame. Pixel Array. transpose (function), 66 pygame.Rect (class), 67–73 pygame.Surface.copy (function), 74, 82 pygame.Rect._coerce_ (function), 67 pygame.Surface.fill (function), 74, 82 pygame.Rect._copy_ (function), 67 pygame.Surface.get_abs_offset (function), 75, pygame.Rect._delitem_ (function), 67 pygame.Rect._delslice_ (function), 67 pygame.Surface.get_abs_parent (function), 75, pygame.Rect._eq_ (function), 67 pygame.Rect._ge_ (function), 68 pygame.Surface.get_alpha (function), 75, 82 pygame.Rect._getitem_ (function), 68 pygame.Surface.get_at (function), 75, 82 pygame.Rect._getslice_ (function), 68 pygame.Surface.get_at_mapped (function), 75, pygame.Rect._gt_ (function), 68 pygame.Rect._le_ (function), 68 pygame.Surface.get_bitsize (function), 75, 83 pygame.Rect._len_ (function), 68 pygame.Surface.get_bounding_rect (function), pygame.Rect._lt_ (function), 68 75.83 pygame.Rect._ne_ (function), 68 pygame.Surface.get_buffer (function), 75, 83 pygame.Rect._nonzero_ (function), 69 pygame.Surface.get_bytesize (function), 76, 83 pygame.Rect._setitem_ (function), 69 pygame.Surface.get_clip (function), 76, 83 pygame.Rect._setslice_ (function), 69 pygame.Surface.get_colorkey (function), 76, 83 pygame.Rect.clamp (function), 69 pygame.Surface.get_flags (function), 76, 83 pygame.Rect.clamp_ip (function), 69 pygame.Surface.get_height (function), 76, 84 pygame.Surface.get_locked (function), 76, 84 pygame.Rect.clip (function), 70 pygame.Rect.collidedict (function), 70 pygame.Surface.get_locks (function), 76, 84 pygame.Rect.collidedictall (function), 70 pygame.Surface.get_losses (function), 77, 84 pygame.Surface.get_masks (function), 77, 84 pygame.Rect.collidelist (function), 70 pygame.Rect.collidelistall (function), 70 pygame.Surface.get_offset (function), 77, 84 pygame.Rect.collidepoint (function), 70 pygame.Surface.get_palette (function), 77, 84 pygame.Rect.colliderect (function), 70 pygame.Surface.get_palette_at (function), 77, pygame.Rect.contains (function), 71 pygame.Rect.copy (function), 71 pygame.Surface.get_parent (function), 77, 85 pygame.Rect.fit (function), 71 pygame.Surface.get_pitch (function), 77, 85 pygame.Rect.inflate (function), 71 pygame.Surface.get_rect (function), 78, 85 pygame.Rect.inflate_ip (function), 71 pygame.Surface.get_shifts (function), 78, 85 pygame.Rect.move (function), 71 pygame.Surface.get_size (function), 78, 85 pygame.Rect.move_ip (function), 71 pygame.Surface.get_view (function), 78, 85 pygame.Rect.normalize (function), 72 pygame.Surface.get_width (function), 78, 86 pygame.Rect.union (function), 72 pygame.Surface.lock (function), 78, 86 pygame.Rect.union_ip (function), 72 pygame.Surface.map_rgb (function), 78, 86 pygame.Rect.unionall (function), 72 pygame.Surface.mustlock (function), 79, 86 pygame.Rect.unionall_ip (function), 72 pygame.Surface.scroll (function), 79, 86 pygame.Surface (class), 73–88 pygame.Surface.set_alpha (function), 79, 86 pygame.Surface.__copy__ (function), 73, 81 pygame.Surface.set_at (function), 79, 86 pygame.Surface.blit (function), 74, 81 pygame.Surface.set_clip (function), 79, 86

pygame.Surface.set_colorkey (function), 79, 87 random.randrange (function), 268 pygame.Surface.set_masks (function), 79, 87 random.sample (function), 269 pygame.Surface.set_palette (function), 79, 87 random.seed (function), 269 pygame.Surface.set_palette_at (function), 80, random.setstate (function), 269 87 random.shuffle (function), 269 pygame.Surface.set_shifts (function), 80, 87 random.SystemRandom (class), 275–277 pygame.Surface.subsurface (function), 80, 87 random.triangular (function), 269 pygame.Surface.unlock (function), 80, 87 random.uniform (function), 270 pygame.Surface.unmap_rgb (function), 80, 87 random.vonmisesvariate (function), 270 pygame.warn_unwanted_files (function), 51 random.weibullvariate (function), 270 random. Wichmann Hill (class), 277–280 random (module), 266–280 random. Wichmann Hill. whseed (function), 279 random.betavariate (function), 267 resource.error (class), 124–125, 156–157, 170– random.choice (function), 267 171, 197–198, 223–224, 248–249 random.expovariate (function), 267 resource.struct_rusage (class), 125–128, 158– random.gammavariate (function), 267 160, 171–174, 198–201, 224–227, 249– random.gauss (function), 267 252 random.getrandbits (function), 267 resource.struct_rusage.__add__ (function), 126, random.getstate (function), 268 158, 172, 199, 225, 250 random.jumpahead (function), 268 resource.struct_rusage.__contains__ (function), random.lognormvariate (function), 268 126, 158, 172, 199, 225, 250 random.normalvariate (function), 268 resource.struct_rusage.__eq__ (function), 126, random.paretovariate (function), 268 158, 172, 199, 225, 250 random.randint (function), 268 resource.struct_rusage.__ge__ (function), 126, random.Random (class), 270–275 158, 172, 199, 225, 250 random.random (function), 268 resource.struct_rusage.__getitem__ (function), random.Random._getstate_ (function), 271 126, 158, 172, 199, 225, 250 random.Random._setstate_ (function), 271 resource.struct_rusage.__getslice__ (function), random.Random.betavariate (function), 271 126, 158, 172, 199, 225, 250 random.Random.choice (function), 271 resource.struct_rusage.__gt__ (function), 126, random.Random.expovariate (function), 271 159, 172, 199, 225, 250 random.Random.gammavariate (function), 271 resource.struct_rusage.__le__ (function), 126, random.Random.gauss (function), 272 159, 172, 199, 225, 250 random.Random.lognormvariate (function), 272 resource.struct_rusage.__len__ (function), 126, random.Random.normalvariate (function), 272 159, 172, 199, 225, 250 random.Random.paretovariate (function), 273 resource.struct_rusage.__lt__ (function), 127, 159, random.Random.randint (function), 273 173, 200, 226, 251 random.Random.randrange (function), 273 resource.struct_rusage.__mul__ (function), 127, random.Random.sample (function), 273 159, 173, 200, 226, 251 random.Random.shuffle (function), 274 resource.struct_rusage.__ne_ (function), 127, random.Random.triangular (function), 274 159, 173, 200, 226, 251 random.Random.uniform (function), 274 resource.struct_rusage.__rmul__ (function), 127, random.Random.vonmisesvariate (function), 160, 173, 200, 226, 251

random.Random.weibullvariate (function), 275 state_machine (module), 281–282

INDEX INDEX

state_machine.StateMachine (class), 281–282 state_machine.StateMachine.draw (function), state_machine.StateMachine.flip_state (function), 281 state_machine.StateMachine.get_event (function), 281 state_machine.StateMachine.setup_states (functime.struct_time.__le__ (function), 295 tion), 281 state_machine.StateMachine.update (function),time.struct_time.__lt__ (function), 295 281 sys (module), 283–290 sys.call_tracing (function), 285 sys.callstats (function), 285 sys.displayhook (function), 284, 285 sys.exc_clear (function), 285 sys.exc_info (function), 286 sys.excepthook (function), 284, 286 sys.exit (function), 286 sys.getcheckinterval (function), 286 sys.getdefaultencoding (function), 286 sys.getdlopenflags (function), 286 sys.getfilesystemencoding (function), 287 sys.getprofile (function), 287 sys.getrecursionlimit (function), 287 sys.getrefcount (function), 287 sys.getsizeof (function), 287 sys.gettrace (function), 287 sys.setcheckinterval (function), 287 sys.setdlopenflags (function), 288 sys.setprofile (function), 288 sys.setrecursionlimit (function), 288 sys.settrace (function), 288 time (module), 291–297 time.asctime (function), 292 time.clock (function), 292 time.ctime (function), 292 time.gmtime (function), 292 time.localtime (function), 292 time.mktime (function), 293 time.sleep (function), 293 time.strftime (function), 293 time.strptime (function), 293 time.struct_time (class), 294–297

time.struct_time.__add__ (function), 294 time.struct_time._contains_ (function), 294 time.struct_time.__eq__ (function), 294 time.struct_time.__ge__ (function), 295 time.struct_time.__getitem__ (function), 295 time.struct_time.__getslice__ (function), 295 time.struct_time.__gt__ (function), 295 time.struct_time.__len__ (function), 295 time.struct_time.__mul__ (function), 295 time.struct_time.__ne_ (function), 295 time.struct_time.__rmul__ (function), 296 time.time (function), 293 time.tzset (function), 293

virtual_controller.decode_joystick_arrow_to_keyboard_key (function), 152, 161, 167 virtual_controller.is_event_type_an_input_down (function), 152, 161, 167 virtual_controller.vc_get_angle (function), 152, 161, 167