INDEX

A
accuracy, 31, 35, 118, 127, 143, 145
adding backdrops, 28, 171
adding costumes, 29, 58, 78, 86, 241
adding extensions, 96
adding labels to buttons, 60
adding list items, 112
adding sprites, 59, 110, 114, 171
AI. See artificial intelligence (AI)
Alexa, 151, 165
Animal sorter (project), 21
  improving, 32
  preparing, 26
  testing, 31
  training, 21
ANPR (automatic number plate recognition), 68
API keys, 16
artificial intelligence (AI), xix
  definition of, 3
  ethical considerations for, 248, 252
  relationship with ML, 3
  rules-based approach, 90, 155
automatic number plate recognition (ANPR), 68
Avoid the monster (project), 187
  describing the game state, 188
  improving, 200
  testing, 197
  training, 189

B
backdrops
  adding, 28, 171
  definition of, xxii
  drawing, xxii, 29, 110
  uploading from the internet, 29
Backdrops tab, xxi, 77, 110
backgrounds. See backdrops
beta testing, 182
bias, 224, 236, 246
  appropriate use of, 248
  unintentional, 224
Bias (project), 238
  preparing, 241
  testing, 244
  testing, 246
  training, 238
buckets, training. See training buckets
CAPTCHA, 146
cars, self-driving, 146, 249
Chatbot (project), 169
  improving, 177
  preparing, 176
  testing, 177
  training, 171
chatbots, 168
classification, 152
Code Area, xxii
Code tab, 30, 60, 79, 88, 112, 243
coding, definition of, 2
computational creativity, 50
certainty, 98, 161, 180
Confuse the computer (project), 225
  improving, 233
  preparing, 230
  testing, 232
  training, 227
confusion matrix, 121, 144
controls in the Scratch interface, xxii
copying example text from the internet, 108
Cortana, 165
Costume Library, 86
costumes
  adding, 29, 58, 78, 86, 241
definition of, xxii
deleting, 30
drawing, 78, 86
renaming, 87, 110
uploading from the internet, 29, 58, 86
  using webcam for, 86
Costumes tab, xxi, 58, 60, 77, 85, 110, 241
crowdsourcing, 182, 221
custom blocks in Scratch, xxii

decision tree classifier, 201
deep learning, 5
deleting blocks in Scratch, 198
drones, 148
duplicating code in Scratch, xxiii, 86

ethics, 182, 248
evaluating models
  accuracy, 31, 35, 118, 127, 143, 145
  comparing against human performance, 65
  confusion matrix, 121, 144
  precision, 126, 143, 145
  recall, 126, 143, 145
  using games, 220
extensions, adding, 96
Extensions Library, 96

games
  use in AI research, 186, 203
  using to evaluate models, 220
Google
  AlphaGo, 204
  DeepMind, 204
Google Home, 151, 165
Green Flag control, xxii

handwriting recognition, 67, 82
healthcare, 20, 225, 249, 252

IBM
  creating API keys, 16
  Deep Blue, 4, 204
  Visual Recognition service, 16
  Watson, 4, 168
  Watson Assistant service, 16
image recognition, 20, 35, 37, 48, 130, 145, 225
intent classification, 152, 167
intentional bias, 237

Judge a book by its cover (project), 52
  improving, 65
  preparing, 56
  testing, 65
  training, 52

Kasparov, Garry, 204

labels, 194, 234
  adding to buttons, 60
  editing, 77
  training buckets and, 47
learning from mistakes, 99
lists
  adding items to, 112
  hiding from Stage, 112
  making, 112, 115, 179
  naming, 112, 179
  project, 9, 16
M
Machine Educable Noughts and Crosses Engine (MENACE), 204
Machine Learning for Kids
creating an account, 14
creating a project, 9
Learn & Test phase, 12
Make phase, 13
training buckets, 11, 47
Train phase, 11
Try it now, 9
machine learning (ML), xix
definition of, 3
ethical considerations for,
182, 252
fields where used, 20, 68, 82,
148, 174, 225, 249, 252
future of, 252
importance of testing, 73, 93
pattern recognition, 20, 33, 46,
50, 84, 93, 104, 225, 234, 247
real-world applications, 20, 68,
82, 84, 145, 151, 182, 185,
225, 237, 249, 252
relationship with AI, 4
Make me happy (project), 90
improving, 96
preparing, 85
testing, 96
training, 90
making a list, 112, 115, 179
making a variable, 60, 115
MENACE (Machine Educable Noughts and Crosses Engine), 204
Michie, Donald, 204, 221
mistakes, 33, 46, 117, 128, 225
bias, 224, 236, 246
learning from, 99
user feedback on, 99, 178
ML. See machine learning (ML)
Ms. Pac-Man competition, 186
negative training examples, 133
neural networks, 4, 202, 204
Newspapers (project), 106
improving, 118
preparing, 110
testing, 114, 117
training, 106
O
optical character recognition (OCR),
67, 82
P
patterns, recognizing, 20, 33, 46, 50,
84, 93, 104, 225, 234, 247
phases of an ML project, 11
pictures, saving from the internet,
26, 241
playing games to evaluate ML
models, 220
precision, 126, 143, 145, 247
project list, 9, 16
projects
Animal sorter, 21
Avoid the monster, 187
Bias, 238
Chatbot, 169
Confuse the computer, 225
Find the duck, 132
Judge a book by its cover, 52
Make me happy, 90
Newspapers, 106
Rock Paper Scissors, 38
Smart classroom, 153
Sorting office, 69
Tic Tac Toe, 205
project templates, xxi, 43, 75, 135,
153, 160, 187, 205
Q
question answering (QA) systems, 168
R
real-world applications for image
recognition systems, 145
CAPTCHA, 146
drones, 148
satellite imagery, 148
natural language, definition of, 152
natural language interface, 152, 165
real-world applications for text recognition systems
chatbots, 168
customer service, 168, 174, 180
natural language interfaces, 152
QA systems, 168
smart assistants, 152
smartphones, 165
recall, 126, 143, 145, 247
recommendations engines, 237
Rock Paper Scissors (project), 38
  improving, 46
  preparing, 42
  testing, 45
  training, 38
Russian Tank problem, 224
satellite imagery, 148
saving pictures from the internet, 26, 241
saving Scratch projects, xxiv
Scratch
  block categories, xxii
  block colors, xxii
  coding, xxii, 2
  custom blocks, xxii
  deleting blocks, 198
  duplicating code, xxiii, 86
  full-screen mode, xxii
  Green Flag, xxii
  interface, xxi
  saving projects, xxiv
  Stop Sign, xxii
script, definition of, xxii
search engines, 50
sections of the Scratch interface, xxi
sentiment analysis
  definition of, 83
  real-world uses of, 84, 180
  social media and, 84
Siri, 151, 165
smart assistants, 151, 165
Smart classroom (project), 153
  improving, 161
  testing, 161
  training, 155
  social media, 20, 84
Sorting office (project), 69
  improving, 82
  preparing, 74
  testing, 81
  training, 69
speech recognition, 97, 163
Speech to Text extension, 96
sprites, 135
  adding, 59, 110, 114, 171
  adding costumes to, xxii, 29, 58, 77
  definition of, xxii
  deleting, 110
  drawing, 59, 111
  renaming, 58, 60
  sorting, 114
  uploading from the internet, 111
Sprites Library, 59
Stage, xxii, 132
  displaying variables on, 62, 122
  finding hidden sprites on, 132
  hiding lists from, 112, 115
Stop Sign control, xxii
supervised learning, 32
templates, project, xx, 43, 75, 135, 153, 160, 187, 205
TensorFlow, 253
Test by drawing, 74
test data, 26, 56, 112, 230
testing, 128, 158
text recognition, 104, 152
Tic Tac Toe (project), 205
  improving, 221
  preparing, 208
  testing, 219
  training, 217
Toolbox, xxi
training buckets, 11
  definition of, 12
  deleting, 12
  labeling, 47
  number of examples in, 12
  removing examples from, 12
training data
  amount, 32, 65, 74, 93, 127, 143, 162, 166, 200, 221
balance, 248
beta testing, 182
collecting, 164, 221
copying example text from the internet, 108
crowdsourcing, 182, 221
distribution, 55
from Scratch, 136, 189, 213
negative examples, 133
on-screen canvas drawing, 70
representative, 33, 35, 174
typing examples, 91, 156, 172
using example pictures from the internet, 23, 54, 228, 241
variation, 47, 82, 91, 139, 236
webcam photos, 39
training, definition of, 3
true negative, 123
true positive, 123
Turing, Alan, 204
U
unintentional bias, 224
Russian Tank problem, 224
using example pictures from the internet, 29, 51, 56, 86, 241
V
variables
displaying on the Stage, 62, 122
making, 60, 115
variation in training data, 47, 82, 91, 139, 236
virtual assistants, 168
W
webcam, 39