



NANO SCIENTIFIC RESEARCH CENTRE

An ISO: 9001:2008 Certified Company

#604, Siri Estates, Opp. Lane to R.S. Brothers, Ameerpet, Hyderabad-500016. Ph: 040-23754144

E-mail: info@nanocdac.com, www.nanocdac.com

1)PYTHON CONCEPTS

Introduction to Python Programming

- Why do we need Python?
- Program structure in Python

Execution steps

- Interactive Shell
- Executable or script files.
- User Interface or IDE

Memory management and Garbage collections

- Object creation and deletion
- Object properties

Data Types and Operations

- Numbers
- Strings
- List
- Tuple
- Dictionary
- Other Core Types

Statements and Syntax in Python

- Assignments, Expressions and prints
- If tests and Syntax Rules
- While and For Loops
- Iterations and Comprehensions

File Operations

- Opening a file
- Using Files
- Other File tools

Functions in Python

- Function definition and call
- Function Scope
- Arguments
- Function Objects
- Anonymous Functions

Modules and Packages

- Module Creations and Usage
- jupyter notebooks
- pandas
- numpy
- matplotlib
- scikit learn
- nltk
- Module Search Path
- Module Vs. Script
- Package Creation and Importing

Classes in Python

- Classes and instances
- Classes method calls
- Inheritance and Compositions
- Static and Class Methods
- Bound and Unbound Methods
- Operator Overloading
- Polymorphism

Exception Handling in Python Programming

- Default Exception Handler
- Catching Exceptions
- Raise an exception
- User defined exception

Advanced Python Concepts

- Decorators

- Generators
- Iterators
- Co-routines
- **Standard Library Modules**
- **Exercises**
- **Roadmap with Python**

2)History and Overview of R

1. What is R?
2. What is S?
3. The S Philosophy
4. Back to R
5. Basic Features of R
6. Free Software
7. Design of the R System
8. Limitations of R
9. R Resources

Getting Started with R

10. Installation
11. Getting started with the R interface

R Nuts and Bolts

12. Entering Input
13. Evaluation
14. R Objects
15. Numbers
16. Attributes
17. Creating Vectors
18. Mixing Objects
19. Explicit Coercion
20. Matrices
21. Lists
22. Factors
23. Missing Values
24. Data Frames
25. Names
26. Summary
27. CONTENTS

Getting Data In and Out of R

28. Reading and Writing Data
29. Reading Data Files with readtable()
30. Reading in Larger Datasets with readta
31. Calculating Memory Requirements for 25

Using the readr Package

Using Textual and Binary Formats fo

32. Using dput() and dump()
33. Binary Formats

Interfaces to the Outside World

34. File Connections
35. Reading Lines of a Text File
36. Reading From a URL Connection

Subsetting R Objects

37. Subsetting a Vector
38. Subsetting a Matrix
39. Subsetting Lists
40. Subsetting Nested Elements of a List
41. Extracting Multiple Elements of a List
42. Partial Matching
43. Removing NA Values

Vectorized Operations

44. Vectorized Matrix Operations

Dates and Times

45. Dates in R
46. Times in R



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47. Operations on Dates and Times	Profiling R Code
48. Summary	103. Using systemtime()
Managing Data Frames with the dplyr package	104. Timing Longer Expressions
49. Data Frames	105. The R Profiler
50. The dplyr Package	106. Using summaryRprof()
51. dplyr Grammar	107. Summary
52. Installing the dplyr package	Simulation
53. select()	108. Generating Random Numbers
54. filter()	109. Setting the random number seed
55. arrange()	110. Simulating a Linear Model
56. rename()	111. Random Sampling
57. mutate()	112. Summary
58. CONTENTS	3) Probability spaces
59. group_by()	1. Conditional probability
60. %>%	2. Independence
61. Summary	Random Variables 9
Control Structures	3. Discrete random variables
62. if-else	4. Continuous random variables
63. for Loops	5. Conditioning on an event
64. Nested for loops	6. Functions of random variables
65. while Loops	7. Generating random variables
66. repeat Loops	8. Multivariate Random Variables
67. next, break	Discrete random variables
68. Summary	9. Continuous random variables
Functions	10. Joint distributions of discrete and continuous variables
69. Functions in R	11. Independence
70. Your First Function	12. Functions of several random variables
71. Argument Matching	13. Generating multivariate random variables
72. Lazy Evaluation	14. Rejection sampling
73. The Argument	Expectation
74. Arguments Coming After the Argument	15. Expectation operator
75. Summary	16. Mean and variance
Scoping Rules of R	17. Covariance
76. A Diversion on Binding Values to Symbol	18. Conditional expectation
77. Scoping Rules	Random Processes
78. Lexical Scoping: Why Does It Matter?	19. Mean and autocovariance functions
79. Lexical vs Dynamic Scoping	20. Independent identically-distributed sequences
80. Application: Optimization	21. Gaussian process
81. Plotting the Likelihood	22. Convergence of Random Processes
82. Summary	23. Types of convergence
Coding Standards for R	Markov Chains
Loop Functions	24. Time-homogeneous discrete-time Markov chains
83. Looping on the Command Line	25. Recurrence
84. lapply()	26. Convergence
85. sapply()	Descriptive statistics
86. split()	27. Sample mean and variance
87. Splitting a Data Frame	28. Order statistics
88. tapply	29. Sample covariance
89. apply()	30. Sample covariance matrix
90. Col/Row Sums and Means	Frequentist Statistics
91. Other Ways to Apply	31. Independent identically-distributed sampling
92. mapply()	32. Mean square error
93. CONTENTS	Consistency
94. Vectorizing a Function	33. Multiple testing
95. Summary	34. Linear Regression
Debugging	35. Linear models
96. Something's Wrong!	36. Least-squares estimation
97. Figuring Out What's Wrong	
98. Debugging Tools in R	
99. Using traceback()	
100. Using debug()	
101. Using recover()	
102. Summary	
	4) Machine Learning with R and Python
	Section 1
	1. Introduction to Data Science



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2. Business Intelligence Vs Data Analysis
3. Data Analysis Vs Data Scientist
4. Data Scientist Roles.
5. Different Disciplines of Data Science
6. Machine Learning overview
7. Natural Language Processing overview
8. Deep Learning overview
9. Artificial Intelligence overview
10. When to use Machine Learning Models and Deep Learning Models.
11. Applications of Machine Learning
12. Why Machine Learning is the Future
13. What are prerequisites for Data Science?
14. Importance of Statistics & essentials of statistics for DS
15. Essentials of mathematics for DS
16. R language essentials for Data Science
17. Python essentials for Data Science
18. Python numpy essentials for Data Science [Recorded Sessions of prerequisites will be given free of cost]
19. Different R language packages used for Data Science
20. Different Python modules used for Data Science
21. Installing Python and Anaconda (Mac, Linux & Windows)
22. Installing R and R Studio (Mac, Linux & Windows)

Section 2

23. Data Preprocessing activities
24. Why need to preprocess data
25. Importing the Libraries
26. Importing the Dataset
27. Python: overview of Object-oriented programming: classes & objects
28. Missing Data
29. Categorical Data
30. Splitting the Dataset into the Training set and Test set
31. Feature Scaling
32. Data Preprocessing Template!

Section 3

33. Machine Learning Life Cycle
34. Types of Machine Learning approaches
35. Examples of Supervised Learning.
36. Examples of unsupervised Learning.
37. Example of semi-supervised learning
38. Example of reinforcement learning
39. Types of data sets used into machine learning
40. Transformations required for datasets.
41. Different approaches to prepare train/validation/test datasets
42. Overview of different predictive models. [When to use what]
43. Guide lines for model selection.
44. How to measure accuracy of a model.

Section 4

44. Predictions using Regression
45. Linear Vs Non Linear Regression
46. Types of Linear Regressions
47. What is slope and intercept.
48. How to Derive Simple Linear Regression coefficients.
49. Dataset + Business Problem Description
50. Simple Linear Regression Intuition – Step 1
51. Simple Linear Regression Intuition – Step 2
52. Simple Linear Regression in Python – Step 1
53. Simple Linear Regression in Python – Step 2
54. Simple Linear Regression in Python – Step 3

56. Simple Linear Regression in R – Step 1
57. Simple Linear Regression in R – Step 2
58. Simple Linear Regression in R – Step 3

Section 5

60. Multiple Linear Regression
61. Dataset + Business Problem Description
62. Multiple Linear Regression Intuition – Step 1
63. Multiple Linear Regression Intuition – Step 2
64. Multiple Linear Regression Intuition – Step 3
66. Prerequisites: What is the P-Value?
67. Multiple Linear Regression Intuition – Step 5
68. Multiple Linear Regression in Python – Step 1
69. Multiple Linear Regression in Python – Step 2
70. Multiple Linear Regression in Python – Step 3
71. Multiple Linear Regression in Python – Backward Elimination – Preparation
72. Multiple Linear Regression in Python – Backward Elimination – HOMEWORK !
73. Multiple Linear Regression in Python – Backward Elimination – Homework Solution
74. Multiple Linear Regression in Python – Automatic Backward Elimination
75. Multiple Linear Regression in R – Step 1
76. Multiple Linear Regression in R – Step 2
77. Multiple Linear Regression in R – Step 3
78. Multiple Linear Regression in R – Backward Elimination – HOMEWORK !
79. Multiple Linear Regression in R – Backward Elimination – Homework Solution
80. Multiple Linear Regression in R – Automatic Backward Elimination

Section 6

81. Polynomial Regression Intuition
82. How to get the dataset
83. Polynomial Regression in Python – Step 1
84. Polynomial Regression in Python – Step 2
85. Polynomial Regression in Python – Step 3
86. Polynomial Regression in Python – Step 4
87. Python Regression Template
88. Polynomial Regression in R – Step 1
89. Polynomial Regression in R – Step 2
90. Polynomial Regression in R – Step 3
91. Polynomial Regression in R – Step 4
92. R Regression Template

Section 7

93. Gradient Descent algorithm for Simple linear Regression.
94. Gradient Descent algorithm for Multiple Linear Regression.
95. Gradient Descent algorithm for polynomial regression.
96. Stochastic Gradient Descent algorithm.
97. Batch gradient Descent algorithm.

Section 8

98. Support Vector Regression
99. How to get the dataset
100. SVR Intuition
102. SVR in Python
103. SVR in R

Section 9

104. Decision Tree Regression
105. Decision Tree Regression Intuition
106. How to get the dataset
107. Decision Tree Regression in Python



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108. Decision Tree Regression in R

Section 10

109. Random Forest Regression

110. Random Forest Regression Intuition

111. How to get the dataset

112. Random Forest Regression in Python

113. Random Forest Regression in R

Section 11

114. Evaluating Regression Models.

115. R-Squared Intuition

116. Adjusted R-Squared Intuition

117. Evaluating Regression Models Performance – Homework's Final Part

118. Interpreting Linear Regression Coefficients

119. Developing Accuracy testing functions.

Section 12

120. Classification Algorithms

121. What is a classification model?

122. Different types of classification models

123. When to use what type of model

124. How to measure accuracy of a classification model

Section 13

125. Logistic Regression

126. How to get the dataset

127. Logistic Regression in Python – Step 1

128. Logistic Regression in Python – Step 2

129. Logistic Regression in Python – Step 3

130. Logistic Regression in Python – Step 4

131. Logistic Regression in Python – Step 5

132. Python Classification Template

133. Logistic Regression in R – Step 1

134. Logistic Regression in R – Step 2

135. Logistic Regression in R – Step 3

136. Logistic Regression in R – Step 4

137. Logistic Regression in R – Step 5

138. R Classification Template

Section 14

139. K-Nearest Neighbors [knn]

140. How to get the dataset

141. K-NN in Python

142. K-NN in R

Section 15

143. Support Vector Machine [svm]

144. SVM Intuition

145. How to get the dataset

146. SVM in Python

147. SVM in R

Section 16

148. Kernel SVM

149. Mapping to a higher dimension

150. The Kernel Trick

151. Types of Kernel Functions

152. How to get the dataset

153. Kernel SVM in Python

154. Kernel SVM in R

Section 17

155. Naive Bayes Classifier

156. Bayes Theorem

157. Naive Bayes in Python

158. Naive Bayes in R

Section 18

159. Decision Tree Classifier

160. Decision Tree Classification Intuition

161. Entropy of Target variable

162. Entropy of Input Variable on Target variable

163. Information Gain

164. How to get the dataset

165. Decision Tree Classification in Python

166. Decision Tree Classification in R

Section 19

167. Random Forest Classification

168. How random forest works

169. How to get the dataset

170. Random Forest Classification in Python

171. Random Forest Classification in R

Section 20

172. Evaluating classification models performance

173. False Positives & False Negatives

174. Confusion Matrix

175. Accuracy Paradox

176. CAP Curve

177. CAP Curve Analysis

Section 21

178. Evaluating classification models performance

179. False Positives & False Negatives

180. Confusion Matrix

181. Accuracy Paradox

182. CAP Curve

183. CAP Curve Analysis

Section 22

184. K-means Clustering

185. K-Means Random Initialization Trap

186. K-Means Selecting the Number Of Clusters

187. How to get the dataset

188. K-Means Clustering in Python

189. K-Means Clustering in R

Section 23

190. Hierarchical Clustering

191. Hierarchical Clustering How Dendrograms Work

192. Hierarchical Clustering Using Dendrograms

193. How to get the dataset

194. HC in Python – Step 1

195. HC in Python – Step 2

196. HC in Python – Step 3

197. HC in Python – Step 4

198. HC in Python – Step 5

199. HC in R – Step 1

200. HC in R – Step 2

201. HC in R – Step 3

202. HC in R – Step 4

203. HC in R – Step 5

Section 24

204. Association Rule Mining

205. What are recommendation systems?

206. Types of recommendation systems

207. Different ARM algorithms.

208. How ARM used for recommendations.

Section 25

209. Apriori algorithm [one of arm]

210. Apriori Intuition

211. How to get the dataset

212. Apriori in R – Step 1

213. Apriori in R – Step 2

214. Apriori in R – Step 3

215. Apriori in Python – Step 1

216. Apriori in Python – Step 2



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217. Apriori in Python – Step 3

Section 26

- 218. Eclat algorithm [ARM]
- 219. Eclat Intuition
- 220. How to get the dataset
- 221. Eclat in R

Section 27

- 222. FPGrowth algorithm [ARM]
- 223. Problems with other ARM model.
- 224. How to construct Growing tree.
- 225. How to get the dataset
- 226. FPGrowth in Python
- 227. FPGrowth in R

Section 28

- 228. Overview of reinforcement learning.
- [Deeply you will learn reinforcement and q-learning in Artificial Intelligence course]
- 229. Overview of text mining and nlp.
- [Deeply you will learn nlp with python with chatbot development In "NLP with Python with chatbots using AI" course]
- 230. Overview of Neural networks and Deep Learning.
- [We do deep dive about Deep learning in "Deep Learning" course With ANN with NN/ANN with DNN/CNN/RNN/SOM with practical's]

231. Case study on Machine Learning

NLP (Natural Language Processing)

Using Python Including Chatbot development using AI

Section 1

- 1. Installation
- 2. Introduction to NLP

Section 2

- 3. Tokenization
- 4. Understanding Tokenization
- 5. Practice Tokenization

Section 3

- 6. Converting Words to their Base Forms
- 7. Understand - Stemming
- 8. Practice - Stemming
- 9. Understand - Lemmatization
- 10. Practice - Lemmatization

Section 4

- 11. Chunks
- 12. U - Chunks
- 13. P - Chunks

Section 5

- 14. Bag of Words
- 15. U - Bag of Words
- 16. P - Bag of Words

Section 6

- 17. Extracting Numerical features from text
- 18. Different feature extraction techniques
- 19. Word existence feature
- 20. Word proportion feature
- 21. Word lexical diversification feature
- 22. TFIDF feature

Section 7

- 23. How to use NLP with Machine Learning models.
- 24. How to use NLP with Deep Learning models.

Section 8

- 25. Category Predictor

26. U - Category Predictor

27. P - Category Predictor

Section 9

- 28. Gender Identifier
- 29. U - Gender Identifier
- 30. P - Gender Identifier

Section 10

- 31. Sentiment Analyzer
- 32. U - Sentiment Analyzer
- 33. P - Sentiment Analyzer

Section 11

- 34. Topic Modeling
- 35. U - Topic Modeling
- 36. P - Topic Modeling

Section 12

- 37. Building spam detector Using Machine Learning
- 38. Building Spam detector using Deep Learning

Part-2: chatbot development using api.ai

Section 13

- 39. Introduction to Chatbots
- 40. Script based chatbots
- 41. AI based chatbots

Section 14

- 42. Deep dive in api.ai
- 43. Introduction to api.ai
- 44. Agents in api.ai
- 45. Domains in api.ai
- 46. Intents in api.ai
- 47. Entities in api.ai
- 48. Types of Entities in api.ai
- 49. Contexts in api.ai
- 50. Build your first conversational chatbot using api.ai

Section 15

- 51. Integrations with api.ai
- 52. Integration of Facebook Messenger with api.ai

Hadoop + (Spark & Scala) Course Content:

1. Big-Data:

- What is Data?
- What is Big-Data?
- Sources of Big-Data.
- Structure Vs Unstructured.
- Big-Data Characteristics..

2. Apache Hadoop:

- Limitation of the Existing solution on Big Data.
- Compare Teradata with Hadoop.
- How hadoop provides the solution for Big Data?
- Apache Hadoop competitors in the market, why Hadoop?
- What is Apache Hadoop?
- History of Apache Hadoop .
- Why name Hadoop ?
- Doug Cutting.
- Forecasting the job market across the globe.
- Discuss Generation 1 Hadoop and Generation 2 Hadoop.

HDFS:

- 3. Distributed File System Advantages and Disadvantages.
- 4. Apache Hadoop Components.

5. Storage:

- Default File System.
- HDFS.
- Simple Storage Service.



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6. Processing:

7. Introducing to Hadoop Distribute File System (HDFS)

- HDFS Components.
- Name Node.
- Secondary Name Node.
- Data Node.

8. Basic of HDFS

- HDFS Architecture.
- Why Block?
- Why default block is 64Mb?

9. Replication and Rack Awareness .

10. What is Cluster ?

11. Anatomy of File Write on HDFS .

12. Anatomy of File Read on HDFS .

13. Secondary Name Node

- What is Fsimage ?
- What is edits.log ?
- Usage of Secondary Name Node.

16. Hadoop Cluster Modes.

- Standalone.
- Psuedo-Distributed.
- Fully-Distributed Mode

17. Core Configuration Files :

- Core-site.xml.
- Hdfs.site.xml.
- Mapred-site.xml.
- Yarn-site.xml
- Masters.
- Slaves.
- 18. Hadoop Copy Commands.

MapReduce:

19. Introducing to MapReduce Framework.

20. MR Framework beyond scenes.

21. Generation 2 : Executing Wordcount Application.

22. Difference between Gen 1 & Gen 2 Hadoop.

24. Advantages of Map Reduce

25. Introduction to YARN

26. Gen - 2 Components.

- Resource Manager.
- Node Manager.
- Container.

27. MapReduce Application Phases in YARN

- Application Submission.
- Job Initialization.
- Resource Manager Failure.

28. Writing MapReduce applications using MR API.

- Driver.
- Mapper.
- Reducer.

Apache HIVE

54. History of Hive.

55. Hive Architecture.

56. Hive Metastore

57. Hive Components.

58. HiveQL.

59. HiveQL datatypes.

60. ACID Hive.

61. Partitioning.

62. Bucketing.

63. Hive Loads.

64. Hive Tables.

65. Hive Views.

66. Hive Diagnosis operators.

Advance Hive

67. Hive on Hbase.

68. Join in Hive.

69. Dynamic Partition.

70. Hive SerDe: JSON Serdes.

71. Hive Parameters.

HBASE

72. Introducing to NoSQL Databases.

75. Three major Hbase Components.

76. HBASE Vs RDBMS.

77. HBASE Versioning.

78. HBASE Shell.

79. Hbase Column Family.

80. Sparse Datastore.

86. Hbase Loading Techniques.

87. Coprocessor.

ZooKeeper

90. Introduction to ZooKeeper.

91. Introduction to ZNODE.

92. Zookeeper ENSEMBLE.

93. ZAP Protocol.

94. ZooKeeper during Failure.

OOZIE

95. Introducing to OOZIE.

96. OOZIE Components.

97. Coordinators.

98. WorkFlow.

100. Creating and Running WorkFlow.

Batch & Real-Time Analytics With Apache Spark.

Scala (Obeject Oriented & Functional Programming).

- Getting Started With Scala.
- Scala History.
- Scala Vs Java & Basics.
- Interactive Scala - DataTypes, Variables, Expressions, SimpleFunctions.
- Running program With Scala Compiler.
- Define Methods & Pattern Matching.

Scala Environment Setup.

- Scala Setup On Windows.
- Scala Setup On Unix.

Functional Programming.

- What is Function Programming ?
- Difference Between OOPS & FPP ?
- Collection For Spark.
- Iterating, Mapping, Filtering & Counting.
- Regular Expressions & Matching with them.
- Maps, Sets, GroupBy, Options, Flatten, Flatmap.
- Wordcount, IO Operations, File Access.

Object Oriented Programming.

- Classes & Properties.
- Objects, Packages & Imports.
- Traits.
- Inheritance & Lists With Multiple Related Types.

Spark Core.

- Batch Vs Real-Time Data Processing.
- Introduction to Spark.
- Spark Vs Hadoop.
- Coding Spark Jobs In Scala.
- Exploring the Spark-Shell

RDD Programming.



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Operations On RDD .

- Transformations.
- Actions.
- Loading Data & Saving Data.
- Key Value Pair RDD.
- Broadcast Variables.
- Persistence.
- Configuring & running the Spark Cluster.
- Exploring to Multi-Node Spark Cluster.
- Cluster Management.
- Submitting Spark Jobs & running in the Cluster Mode.
- Developing Spark Application in Eclipse.

Spark Streaming.

- Introducing Of Spark Streaming.
- Architecture Of Spark Streaming.
- Processing Distributed Log Files In Real Time.
- Discretized Streams RDD.
- Applying Transformations & Actions On Streaming Data.
- Integration With Flume & Kafka.
- Monitoring Streaming Jobs.

Spark SQL.

- Introduction to Apache Spark SQL.
- The SQL Context.
- Importing & Saving Data.
- Processing the Textfile, JSON & Parquet Files.
- DataFrames.
- User-Defined Functions.
- Using Hive.
- Local Hive Metastore Server.
- Integrating With Hive.
- Integrating With MySQL.

Spark MLIB

- Introduction to Machine Learning.
- Types Of Machine Learning.
- Introduction to Apache Spark MLIB Algorithms.
- Regression & Classification Algorithms.

Deep Learning

Part 1 - Artificial Neural Networks

All below sections will be implemented with tensorflow and keras, Programming knowledge of tensorflow and keras will be given during model buildings.

Section 1

1. Artificial Neural networks Intuition
2. Plan of Attack
3. The Neuron
4. The Activation Function
5. How do Neural Networks work?
6. How do Neural Networks learn?
7. Gradient Descent
8. Stochastic Gradient Descent
9. Backpropagation

Section 2

10. Building an ANN
11. Prerequisites
12. How to get the dataset
13. Business Problem Description
14. Building an ANN - Step 1
15. Building an ANN - Step 2

16. Building an ANN - Step 3
17. Building an ANN - Step 4
18. Building an ANN - Step 5
19. Building an ANN - Step 6
20. Building an ANN - Step 7
21. Building an ANN - Step 8
22. Building an ANN - Step 9
23. Building an ANN - Step 10

Section 3

24. Homework Challenge - Should we say goodbye to that customer?
25. Homework Instruction
26. Homework Solution

Section 4

27. Evaluating, Improving and Tuning the ANN
28. Evaluating the ANN
29. Improving the ANN
30. Tuning the ANN

Part 2 - Convolutional Neural Networks

Section 5

31. CNN Intuition
32. What you'll Need for CNN
33. Plan of attack
34. What are convolutional neural networks?
35. Step 1 - Convolution Operation
36. Step 1(b) - ReLU Layer
37. Step 2 - Pooling
38. Step 3 - Flattening
39. Step 4 - Full Connection
40. Summary
41. Softmax
42. Cross-Entropy

Section 6

43. Building a CNN
44. How to get the dataset
45. Introduction to CNNs
46. Building a CNN - Step 1
47. Building a CNN - Step 2
48. Building a CNN - Step 3
49. Building a CNN - Step 4
50. Building a CNN - Step 5
51. Building a CNN - Step 6
52. Building a CNN - Step 7
53. Building a CNN - Step 8
54. Building a CNN - Step 9
55. Building a CNN - Step 10

Section 7

56. Homework - What's that pet ?
57. Homework Instruction
58. Homework Solution
59. Evaluating, Improving and Tuning the CNN

ARTIFICIAL*INTELLIGENCE

Section 1

1. Why AI?
2. Introduction
3. How to get data from practice
4. Some Additional Resources!!

Section 2: Reinforcement Learning

5. Fundamentals of Reinforcement Learning

Section 3: Q-Learning Intuition

6. Plan of Attack



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7. What is reinforcement learning?
8. The Bellman Equation
9. The "Plan"
10. Markov Decision Process
11. Policy vs. Plan
12. Adding a "Living Penalty"
13. Q-Learning Intuition
14. Temporal Difference
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