Graph Analytics for Big Data

by University of California San Diego

About this Course

Want to understand your data network structure and how it changes under different conditions? Curious to know how to identify closely interacting clusters within a graph? Have you heard of the fast-growing area of graph analytics and want to learn more? This course gives you a broad overview of the field of graph analytics so you can learn new ways to model, store, retrieve and analyze graph-structured data.

After completing this course, you will be able to model a problem into a graph database and perform analytical tasks over the graph in a scalable manner. Better yet, you will be able to apply these techniques to understand the significance of your data sets for your own projects.

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Taught by:
Amarnath Gupta, Director, Advanced Query Processing Lab
San Diego Supercomputer Center (SDSC)

Basic Info	Course 5 of 6 in the Big Data Specialization
Commitment	4 Weeks, 3-5 hours/week
Language	English, **Subtitles:** Arabic, French, Bengali, Ukrainian, Chinese (Simplified), Greek, Italian, Portuguese (Brazil), Dutch, Korean, Oriya, German, Pashto, Urdu, Russian, Thai, Indonesian, Swedish, Turkish, Azerbaijani, Spanish, Dari, Hindi, Japanese, Kazakh, Hungarian, Polish
How To Pass	Pass all graded assignments to complete the course.
User Ratings	Average User Rating 4.3

Syllabus

Module 1

Welcome to Graph Analytics

Meet your instructor, Amarnath Gupta and learn about the course objectives.

1 video, 1 reading

1. **Video:** Welcome to Graph Analytics for Big Data
2. **Reading:** Downloading Hands-On Materials

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Module 2

Introduction to Graphs

Welcome! This week we will get a first exposure to graphs and their use in everyday life. By the end of the module you will be able to create a graph applying core mathematical properties of graphs, and identify the kinds of analysis questions one might be able to ask of such a graph. We hope the you will be inspired as to how graphical representations might enable you to answer new Big Data problems!

8 videos, 2 readings

1. **Reading:** What to learn in this module
2. **Video:** What is a Graph?
3. **Video:** Why Graphs?
4. **Discussion Prompt:** Let's Discuss: What else do you interact with that can be represented as a graph?
5. **Video:** Why Graphs? Example 1: Social Networking
6. **Video:** Why Graphs? Example 2: Biological Networks
7. **Video:** Why Graphs? Example 3: Human Information Network Analytics
8. **Video:** Why Graphs? Example 4: Smart Cities
9. **Video:** The Purpose of Analytics
10. **Video:** What are the impact of Big Data's V's on Graphs?
11. **Discussion Prompt:** Optional: What's the most interesting graph you reviewed?
12. **Reading:** Download Slides for this Module

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Graded: Introduction to Graphs

Graded: Graphs in Everyday Life

Module 3

Graph Analytics

17 videos, 3 readings

1. **Reading:** What to learn in this module
2. **Video:** Focusing On Graph Analytics Techniques
3. **Reading:** If this module takes a little longer... that's OK!
4. **Reading:** Download All Slides for Module 3
5. **Video:** Path Analytics
6. **Video:** The Basic Path Analytics Question: What is the Best Path?
7. **Video:** Applying Dijkstra's Algorithm
8. **Video:** Inclusion and Exclusion Constraints
9. **Discussion Prompt:** Let's Discuss: Where do you see path problems in your life?
10. **Video:** Connectivity Analytics
11. **Video:** Disconnecting a Graph
12. **Video:** Connectedness: Indegree and Outdegree
13. **Video:** Community Analytics and Local Properties
14. **Discussion Prompt:** Let's Discuss: What kind of community analytics question would you like to ask?
15. **Video:** Global Property: Modularity
16. **Video:** Centrality Analytics
17. **Video:** Optional Lecture 1: Bi-directional Dijkstra Algorithm
18. **Video:** Optional Lecture 2: Goal-directed Dijkstra Algorithm
19. **Video:** Optional Lecture 3: Power Law Graphs
20. **Video:** Optional Lecture 4: Measuring Graph Evolution
21. **Video:** Optional Lecture 5: Eigenvector Centrality
22. **Video:** Optional Lecture 6: Key Player Problems

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Graded: Graph Analytics Applications

Graded: Connectivity, Community, and Centrality Analytics

Module 4

Graph Analytics Techniques

Welcome to the 4th module in the Graph Analytics course. Last week, we got a glimpse of a number of graph properties and why they are important. This week we will use those properties for analyzing graphs using a free and powerful graph analytics tool called Neo4j. We will demonstrate how to use Cypher, the query language of Neo4j, to perform a wide range of analyses on a variety of graph networks.

7 videos, 9 readings

1. **Reading:** Downloading and Installing Docker Desktop
2. **Reading:** Running Neo4j container
3. **Video:** Running Neo4j container
4. **Reading:** Hands-On: Getting Started With Neo4j
5. **Video:** Hands-On: Getting Started With Neo4j
6. **Reading:** Hands-On: Modifying a Graph With Neo4j
7. **Video:** Hands-On: Modifying a Graph With Neo4j
8. **Reading:** Hands-On: Importing Data Into Neo4j
9. **Video:** Hands-On: Importing Data Into Neo4j
10. **Reading:** Hands-On: Basic Queries in Neo4j
11. **Video:** Hands-On: Basic Queries in Neo4j
12. **Reading:** Hands-On: Path Analytics in Neo4j With Cypher
13. **Video:** Hands-On: Path Analytics in Neo4j Using Cypher
14. **Reading:** Hands-On: Connectivity Analytics in Neo4j with Cypher
15. **Video:** Hands-On: Connectivity Analytics in Neo4j With Cypher
16. **Reading:** Assignment: Practicing Graph Analytics in Neo4j With Cypher

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Graded: Quiz: Graph Analytics With Neo4j

Graded: Assessment Questions on 'Practicing Graph Analytics in Neo4j With Cypher'

Module 5

Computing Platforms for Graph Analytics

In the last two modules we have learned about graph analytics and graph data management. This week we will study how they come together. There are programming models and software frameworks created specifically for graph analytics. In this module we'll give an introductory tour of these models and frameworks. We will learn to implement what you learned in Week 2 and build on it using GraphX and Giraph.

11 videos, 6 readings

1. **Video:** Introduction: Large Scale Graph Processing
2. **Video:** A Parallel Programming Model for Graphs
3. **Video:** Pregel: The System That Changed Graph Processing
4. **Video:** Giraph and GraphX
5. **Video:** Beyond Single Vertex Computation
6. **Video:** Introduction to GraphX: Hands-On Demonstrations
7. **Reading:** Datasets and Libraries for Example of Analytics Hands On
8. **Video:** Hands On: Building a Graph
9. **Reading:** Hands On: Building a Graph
10. **Video:** Hands On: Building a Degree Histogram
11. **Reading:** Hands On: Building a Degree Histogram
12. **Video:** Hands On: Plot the Degree Histogram
13. **Reading:** Hands On: Plot the Degree Histogram
14. **Video:** Hands On: Network Connectedness and Clustering Components
15. **Reading:** Hands On: Network Connectedness and Clustering Components
16. **Video:** Hands On: Joining Graph Datasets
17. **Reading:** Hands On: Joining Graph Datasets

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Graded: Using GraphX

View Less

How It Works

General

What do start dates and end dates mean?

Once you enroll,
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Peer-graded assignments

Peer-graded assignments require you and your classmates to grade each other's work.
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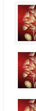

Introduction to Big Data
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Machine Learning With Big Data
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