



Data Analysis & Programming for Operations Management (DAPOM)

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Wout van Wezel (Coordinator)

w.m.c.van.wezel@rug.nl

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Nick Szirbik

Jan Eise Fokkema

Winward Fang

Christos Emmanouilidis

Nicky van Foreest



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- > Why, What, How, and When of Dapom

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Why Dapom?

Since December 2013, data science postings have rocketed 256%—more than tripling. Houston, San Francisco offer the best salaries for data scientists.

Data scientists are in high demand

Data scientist job postings, per 1 million postings on Indeed

Back in 2012, [21st Century.](#) are looking to is growing, Ind be enough skill scientist job m

1,200
1,000
800
600
400
200
0

Best Jobs ▼ 2019 ▼ United States ▼

	Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1	Data Scientist	\$108,000	4.3/5	6,510
#2	Nursing Manager	\$83,000	4/5	13,931
#3	Marketing Manager	\$82,000	4.2/5	7,395

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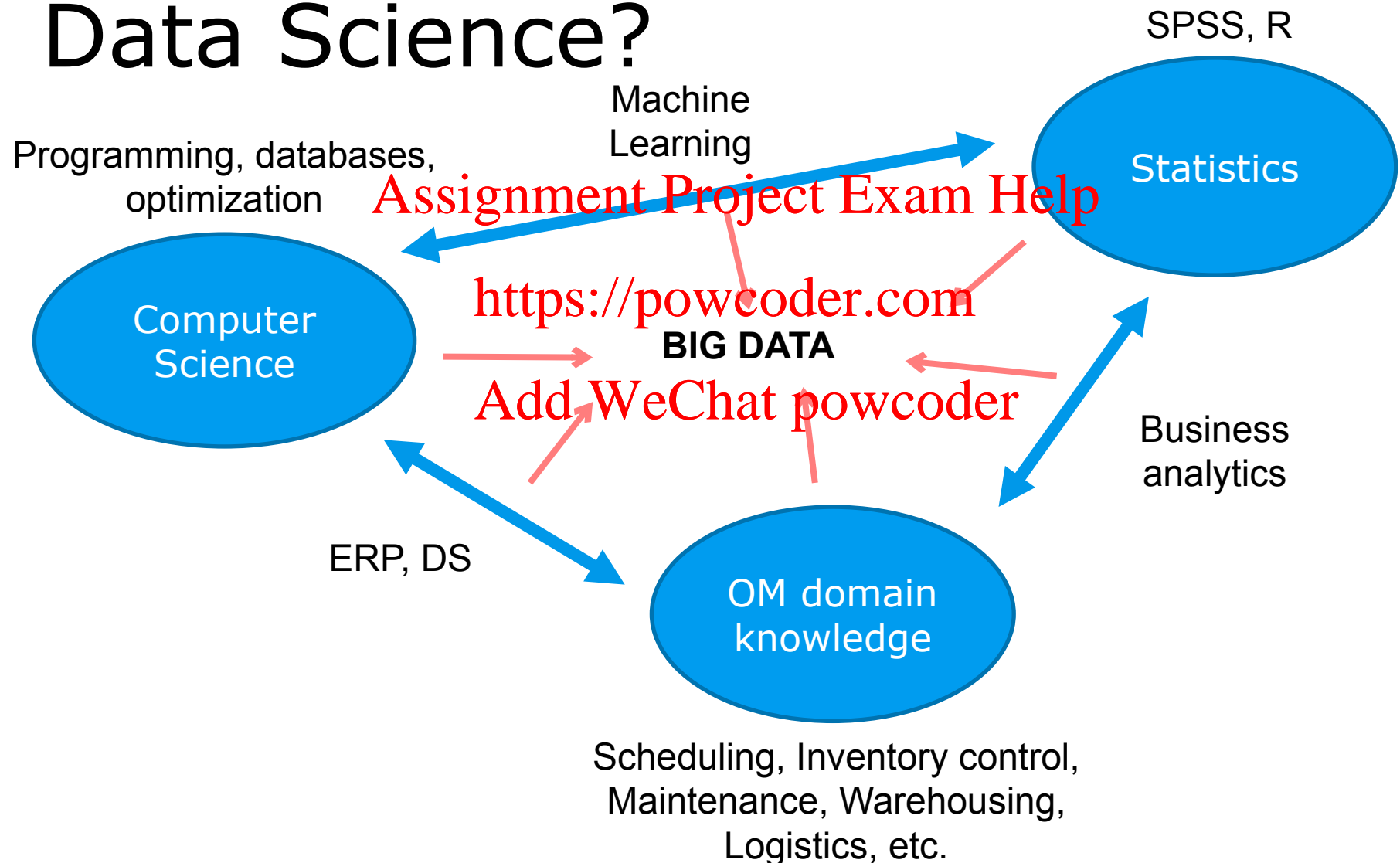
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50 Best Jobs in America for 2019



Data Science?





Why Dapom?

- › Many developments (and lots of job openings) in Data Science. **Assignment Project Exam Help**
- › Data Science is applied in marketing, online advertising, natural sciences, astronomy, etc. **<https://powcoder.com>**
- › What about Operations Management? **Add WeChat powcoder**
- › An ERP system of a single factory is not really interesting for Data Science.
- › Recent developments: organizations start generating Big Data
 - Supply Chain Integration
 - Horizontal collaboration in transportation
 - Internet of Things: individual machines that collect data



Why Dapom?

- > The availability of data makes Data Science interesting for Operations Management

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- > OM theory, concepts, and tools to include Big Data are not yet standardized

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- > So we have to fall back on the basic tools:
 - Programming
 - Optimization libraries
 - Databases



Learning goals

> You will learn how you can:

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- Create a computer program
- Solve optimization models

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- Handle big data

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> You can use these skills in other courses, in your thesis, and in your future jobs



Learning goals

- > We are not a computer science program.

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- > Main design goals regarding programming skills:

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- You don't need to be experts, but you should be able to recognize experts.
- Maybe you won't program yourself in your future job, but you must be able determine what is technically possible and what a reasonable price tag is if you hire a programmer.



Learning goals

- › Programming is more a mindset than a skill.

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- › Essentially, programming is really easy. We have:

- Variables <https://powcoder.com>

`a=3, b=2, c=a+b`

- Branching based on conditions

`if a > 4 then a=a+2 else a=a+3`

- Iteration

`while a<b do a=a*2`

- Encapsulation (procedures, objects, libraries): combine multiple programming commands to logical units that you can reuse.



Learning programming

- > The challenge is to get your mind working a bit like a computer. You must learn how to visualize variables, branching, and iteration.

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- > You learn this by iteratively:
 - Doing (including failing)
 - Looking at how others solved their problems
- > You don't learn if you copy code and confirm that it works. You need to understand why it works, otherwise you'll get in to problems when things get more complex.



Role in TOM program

- > Prerequisite knowledge:

- BSc Operations Management
- Statistics

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- > DAPOM

- Programming, optimization, big data

- > You can use DAPOM skills in other TOM courses and in your thesis

- warehousing, scheduling, simulation, inventory management, maintenance, energy transition



Examples in theses

- › Bram de Brabander: Production scheduling system for Philips

- Usable factors of scheduling systems

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- › Stan Engbers: Staff scheduling system for social organizations

- Including constraints and goals for less-abled employees

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- › Max Cornel: Data analysis of 7 years of shift data of 2200 engineers at KLM, looking at health of schedules

- Staff schedules should focus on when you rest, not when you work

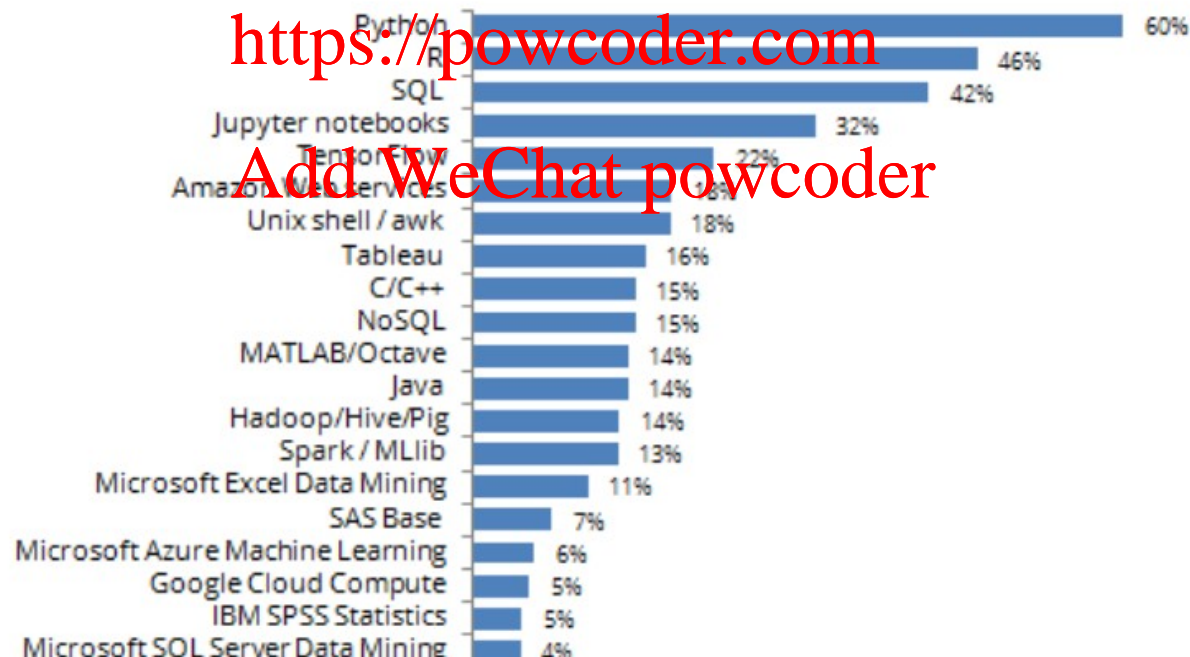
- › Jamil Karchoud: Neural network to detect production errors at Luxaflex (window blinds)

- Using image recognition in a factory



How?

Data Science / Analytics Tools, Technologies and Languages Used in Past Year



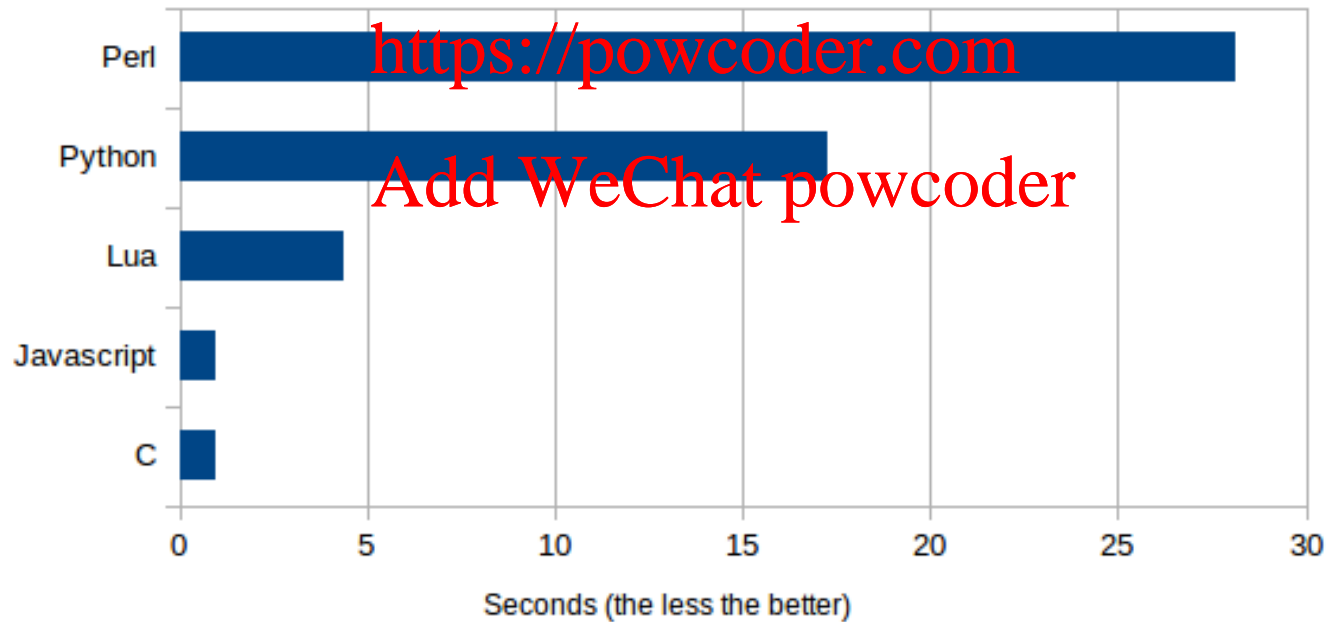


Why Python?

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Why Python?

- > Easy to learn
- > Very good 'ecosystem': development tools, libraries, communities
- > Lots of people use it, so many code examples and answers to questions can be found online
- > Performance intensive tasks are done by libraries (for example, optimization in Gurobi). These libraries are typically written in the programming language C and very fast

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How?

- > We will use the programming language Python and appropriate libraries to go through the various data science steps:

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- Data collection (e.g., machine failure data)
- Data manipulation (e.g., filtering, aggregation)
- Data exploration & analysis (statistics, machine learning)
- Optimization (routing, maintenance intervals, scheduling).
This transcends traditional data science!



How?

> Examples

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- Determine the best warehouse design based on millions of pickup activities.

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- Determine the number of bicycle couriers needed based on expected cycling speed (including traffic and weather conditions)
- Determine the optimal maintenance intervals based on world wide machine failure data.



When?

- › Manuals, screencasts, and video lectures
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- › Weekly practicals with assignments to work together and ask questions. **<https://powcoder.com>**
- › The practicals **Add WeChat powcoder** are there mainly to teach you the mindset for programming.
- › If you already have considerable programming experience, you'll probably finish practicals early and can do additional advanced exercises.
- › Assessment:
 - Big individual final assignment, and an oral exam



Last note

> Programming is:

- 35% thinking how to attack a problem, of which 80% is spent on searching how others attacked it
- 20% to search for existing code.
- 15% to understand the existing code.
- 30% to code yourself, of which 40% is spent on debugging, and 40% on performance profiling and improving.

(numbers are approximate, based on experience)

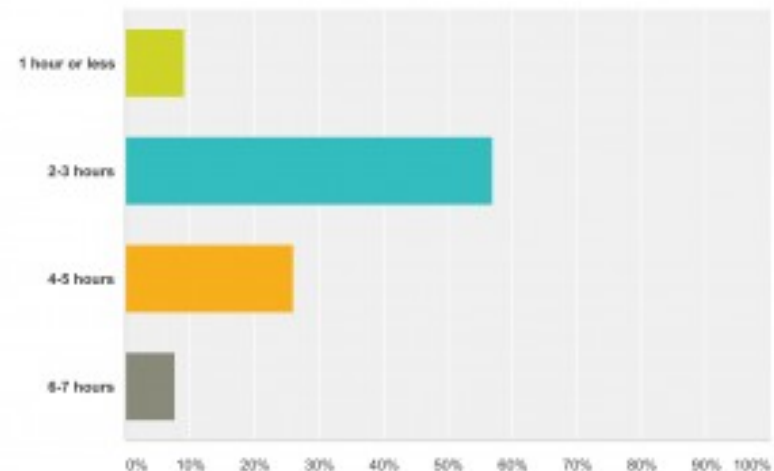
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About how much time do you spend coding per work day? This DOESN'T include research, googling, reading, or anything other than just typing code.

Answered: 65 Skipped: 0





> We wish you happy coding!

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