Analytics and Big Data

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Why is Modern Analytics so Successful?

1. More Data for the Analysis

2. More Computing Power

3. New Methods and Algorithms

4. New Analytics Processes

More Data for the Analysis

Internet of Things as a driver of data

Source: Bernard Marr; Source: Ruoming Jin

Social media as a driver of data

Worldwide Corporate Data Growth

Computing Power

Growth of Computing Power

The rapid acceleration of computing power—driven by advances in hardware, cloud infrastructure, and parallel processing—has enabled modern analytics and machine learning to scale to massive datasets.
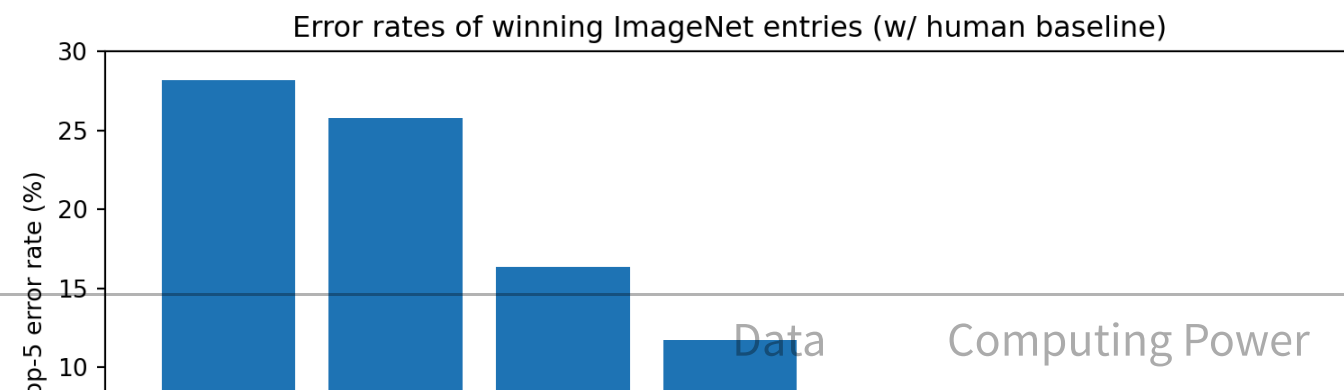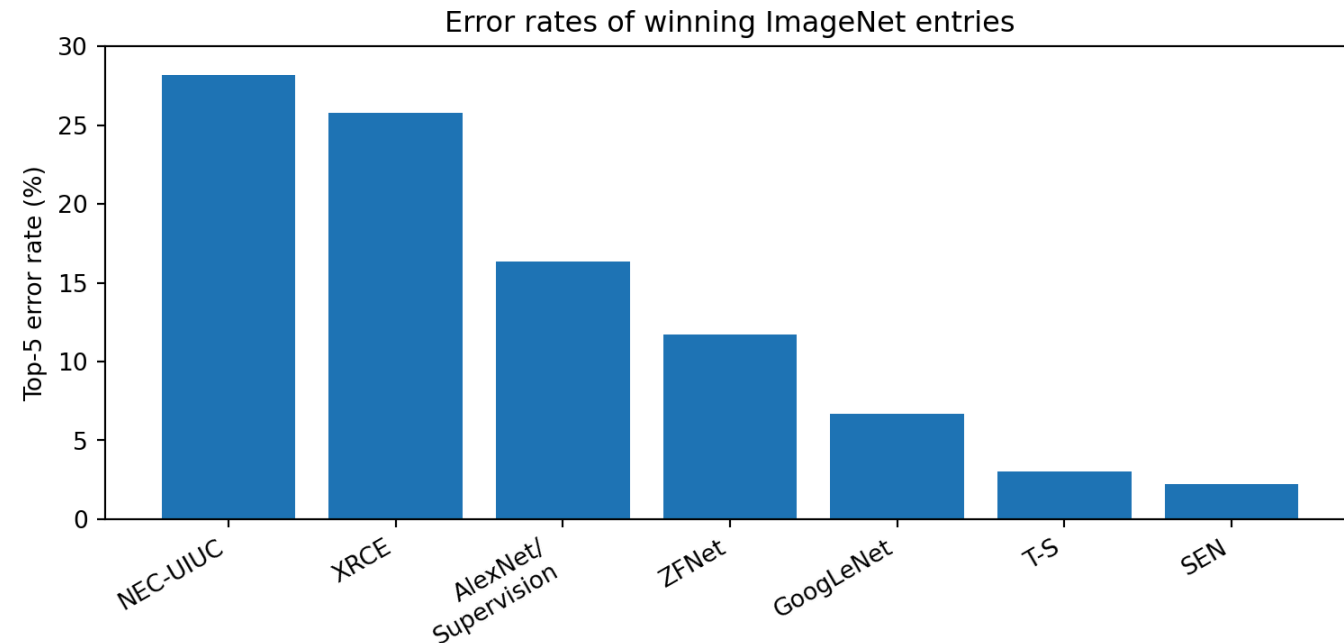
Algorithms

Old vs. New Methods

Traditional Regression

Decision Tree

Neural Network

Source: Lalit Sachan

ImageNet

ImageNet is a large-scale image recognition competition where models compete to classify millions of images across thousands of categories. Breakthrough models have historically demonstrated major advances in deep learning.: Models vs Human Baseline

Error rates of winning ImageNet entries

Error rates of winning ImageNet entries (w/ human baseline)

New Analytics Processes

Traditional vs. Modern Analytics Process

Traditional Analytics Process:

Modern Analytics Process:

From the Past to the Present

Evolution of Analytics

Source: http://juxt.pro/blog/posts/machine-learning-with-clojure.html

Types of Analytics (I)

Source: Schmarzo, p. 88

Types of Analytics (II)

Descriptive

- What happened in the past?

- Example: Report the profits of the last years.

Predictive

- Find patterns and relationships in data and use them for prediction.

- Example: Find the functional relationship between price and demand.

Prescriptive

- Use the predictions to make decisions.

- Example: Set the best price to optimize the profit.

Types of Analytics (III)

What happened? (descriptive / BI)	What will happen? (predictive analytics)	What should I do? (prescriptive analytics)
How many widgets did I sell last month?	How many widgets will I sell next month?	Order **5,000** units of Component Z to support widget sales for next month.
What were sales by zip code for Christmas last year?	What will be sales by zip code over this Christmas season?	Hire **Y** new sales reps by these zip codes to handle projected Christmas sales.
How many of Product X were returned last month?	How many of Product X will be returned next month?	Set aside **$125K** in financial reserve to cover Product X returns.
What were company revenues and profits for the past quarter?	What are projected company revenues and profits for next quarter?	Sell the following product mix to achieve quarterly revenue and margin goals.
How many employees did I hire last year?	How many employees will I need to hire next year?	Increase hiring pipeline by **35%** to achieve hiring goals.

Source: Schmarzo, p. 13

Data   Computing Power   Algorithms   **Analytics Processes**

Descriptive Analytics Process

Predictive Analytics Process

Example Inventory Planning

On the basis of more than 300 million data records per week, Otto makes more than one billion forecasts per year on the sales development of individual articles for the next days and weeks. Such forecasts allow Otto to reduce its own inventories by up to 30% on average.

Source: http://www.bvl.de/misc/filePush.php?mimeType=application/pdf&fullPath=/files/441/442/777/1015/DLK12_C3-3_Praesentation_Stueben.pdf

Classical Corporate Planning

Example Driver-based Planing (I)

Example Driver-based Planing (II)

1. Sales forecasts based on market and social media data

2. Automated pricing based on market and competitor analyses

3. Early detection of price changes and adjustment of purchasing behavior

4. Optimization of inventory management based on customers' current purchasing preferences

Data   Computing Power   Algorithms   **Analytics Processes**

Summary

- Modern analytics is driven by data availability, computing power, and new methods.

- Analytics evolves from descriptive to predictive and prescriptive insights.

- Modern processes rely on automation, scalability, and data-driven decision making.