Deep Learning for Business

Business with
Deep Learning & Machine Learning

Characteristics of Businesses with DL & ML

Business Applications of Machine Learning & Deep Learning

Deep learning excels on classification, prediction, and generative tasks across a number of domains

- **Structured data**
  - **Time Series** (discrete data values indexed in time order)
  - **RDBMS** (Relational Database Management System)
  - **RDSMS** (Relational Data Stream Management System)
- **Unstructured data**
  - **Sound**
  - **Text**
  - **Image**
  - **Video**

Business Applications of Machine Learning & Deep Learning

Structured Data

- **Time Series**
  - ✓Log analysis & Risk detection
    - Data centers, Security, Finance
  - ✓Enterprise resource planning
    - Manufacturing, Automation, Supply chain
  - ✓Predictive analysis using sensor data
    - IoT, Smart home, Hardware manufacturers

Business Applications of Machine Learning & Deep Learning

Structured Data

- **Time Series**
  - ✓Business and Economic analytics
    - Finance, Accounting, Government
  - ✓Market data
    - Finance
  - ✓Server logs
    - Cybersecurity
  - ✓Recommendation engine
    - e-commerce, Media, Social Networks

Business Applications of Machine Learning & Deep Learning

Structured data

- **RDBMS (Relational Database Management System)**
  - ✓Relational model based DBMS (Database Management System) that uses tables (set of rows and columns)
  - ✓Data is presented to the user based on relations
  - ✓Relational operators are provided to enable manipulation of data

Business Applications of Machine Learning & Deep Learning

Structured Data

- **RDSMS (Relational Data Stream Management System)**
  - ✓DSMS (Data Stream Management System) that uses a distributed computing structure, in-memory, and SQL queries to process real-time structured and unstructured data streams

Business Applications of Machine Learning & Deep Learning

Structured Data

- **RDSMS (Relational Data Stream Management System)**
  - ✓RDSMS SQL queries do not exit after being executed in order to generate continuous results as new data streams enter the database

Business Applications of Machine Learning & Deep Learning

Deep learning excels on classification, prediction, and generative tasks across a number of domains

– **Unstructured Data**
  - **Sound**
  - **Text**
  - **Image**
  - **Video**

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Sound**
  - ✓Voice recognition
    - UX, UI, Automotive, Security, IoT
  - ✓Voice search
    - Smartphone developers, Telecom
  - ✓Sentiment analysis
    - CRM (Customer Relationship Management)

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Sound**
  - ✓Flaw detection (Engine noise)
    - Automotive, Aviation, Manufacturing
  - ✓Fraud detection
    - Finance
    - Credit Cards
    - Banking
    - Payments processing

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Text**
  - ✓Sentiment analysis
    - CRM, Social media, Reputation management
  - ✓Threat detection
    - Government, social media
  - ✓Fraud detection
    - Insurance, Banking, Finance

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Text**
  - ✓Language translation
    - Government, Private
  - ✓Augmented searching
  - ✓Theme detection
    - Finance

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Image**
  - ✓Facial recognition
  - ✓Image search
    - Government, Social media
  - ✓Machine vision
    - Manufacturing, Robotics, Automotive, Aviation

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Image**
  - ✓Medical imaging
    - X-ray, CT, MRI scanning
    - Medicine
  - ✓Photo clustering
    - Telecos
    - Smartphone companies
    - OS (Operating System) developers

Business Applications of Machine Learning & Deep Learning

Unstructured Data

- **Video**
  - ✓Motion detection
    - Gaming, Robotics, UX, UI
  - ✓Threat prediction
    - Government, Transportation
  - ✓Real-time threat detection
    - Security, Airports

DL & ML Deployment Options

Hardware

- CPU (Central Processing Unit)
- GPU (Graphics Processing Unit)
- ASIC (Application-Specific Integrated Circuit)
- FPGA (Field-Programmable Gate Array), etc.

Software

- OS (Operating System) & Library
- API (Application Programming Interface), etc.

DL & ML Deployment Options

Using pre-trained models

- IBM Watson
- Google
  - DeepMind AlphaGo
  - TensorFlow 0.12, TensorFlow 1.0
  - Inception-v3, Inception-v4, etc.
- Nvidia DGX-1
- Baidu DeepBench
- etc.

Competitive Landscape and Opportunities

- Major players are providing open-source deep learning frameworks to attract developer talent and influence downstream applications
- Large open-source community maintains frameworks, provides support, and drives new application areas
- Web-scale companies have a competitive advantage due to data volumes and large capital reserves for hardware

Competitive Landscape and Opportunities

- Opportunities abound for deep learning to be applied to new industries and application areas

- Leading Product Vendors & Service Providers
  - Google
  - Baidu
  - Microsoft
  - Facebook
  - Amazon
  - Samsung, etc.

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