

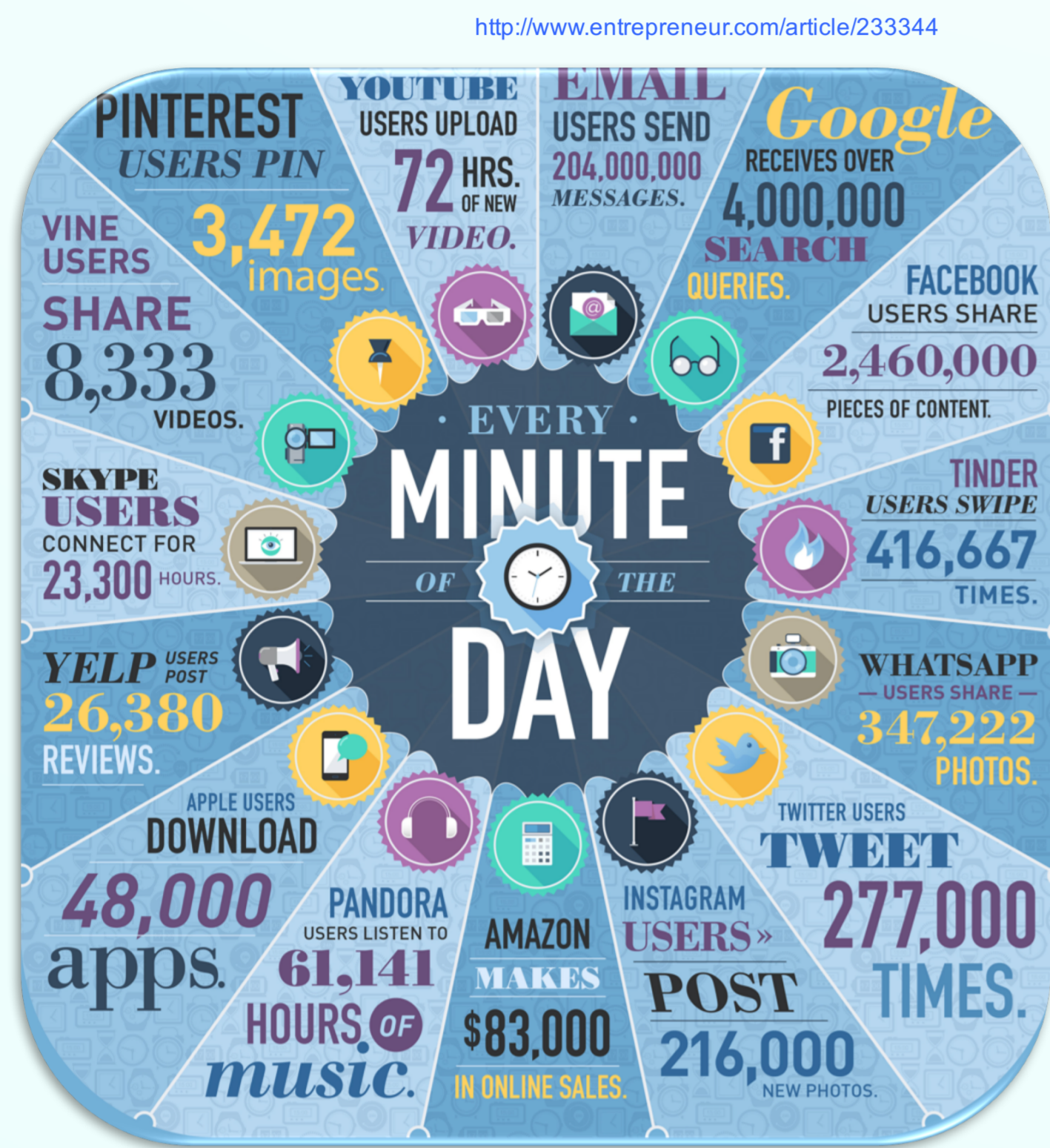
Contribution to Knowledge Search in Video Content

Author: Francisco Javier Rodríguez González
Thesis Advisors: Cristina López Bravo, Enrique Costa Montenegro
Ph.D. Program: Information and Communications Technology of the University of Vigo



Motivation

- 2016: still living in the **Information Era**



- LHC** 50-100 PB/year
- "The reason for BD is Machine learning"
Christopher Nguyen, Google Founder's Award
- Machine learning extracts knowledge

- Human memory system**

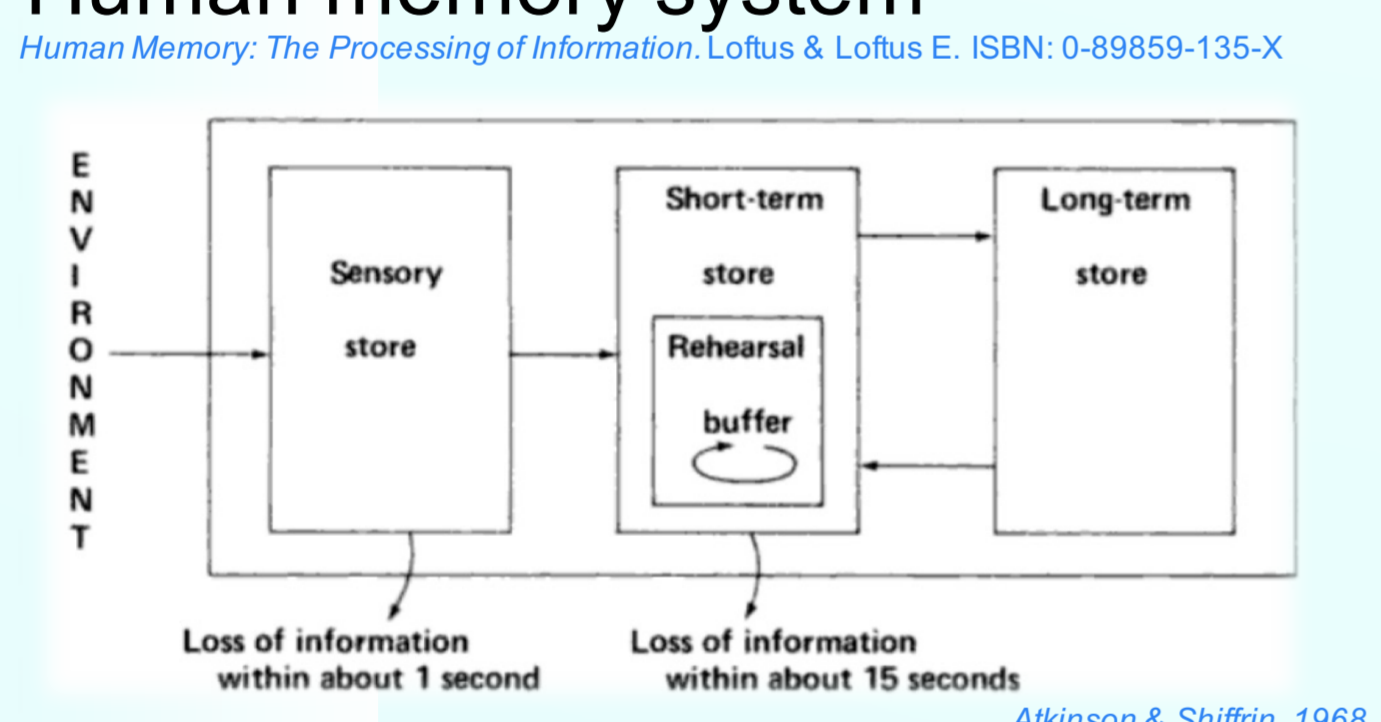
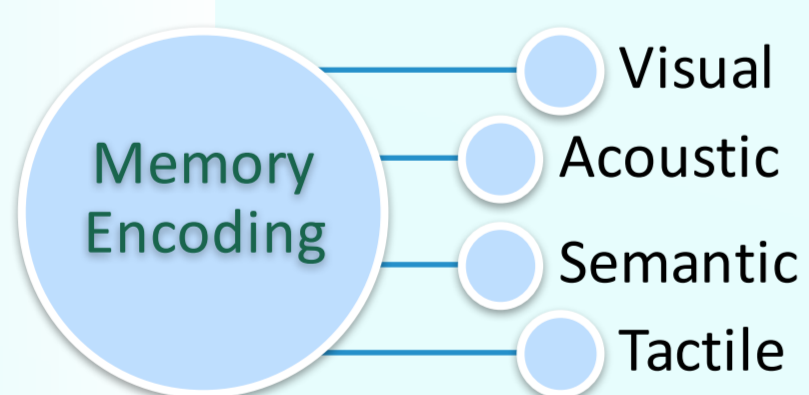


Figure: Two-Store Memory model



FACTS

- Memory is malleable and un-reliable
- Associations help to remember
- Recording needs repetition, retrieval

Thesis Objectives

Define a software Architecture that is able to **assist in Knowledge retrieval**, searching in previously studied content: video, audio, image, text, etc, creating associations and becoming "My Memory assistant" to the digital world as a source of knowledge.

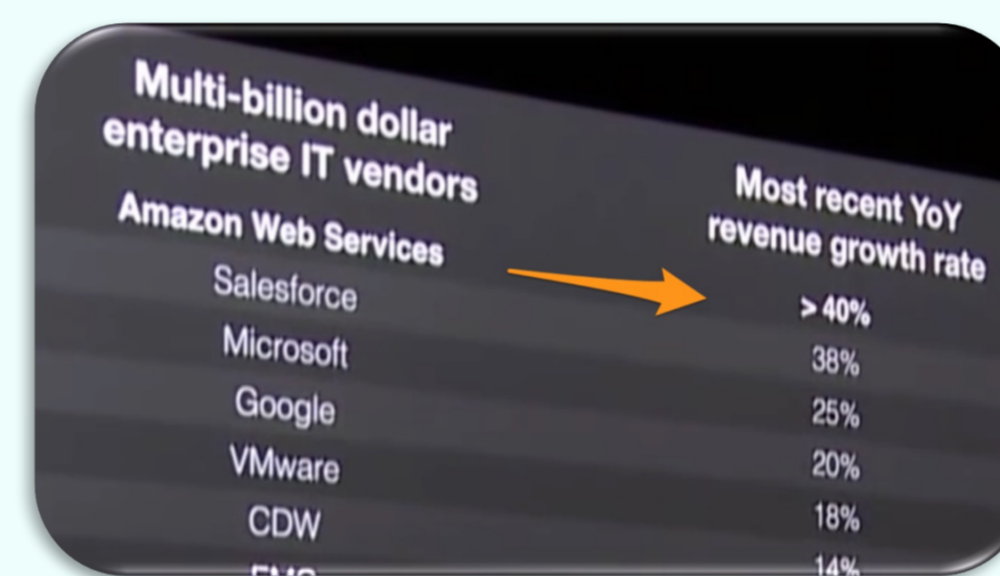
Objectives

- Web Scale, multitenant, micro-services
- Cloud intelligence, Open Source -> Apache license
- Multimodal learning
 - OCR, voice transcripts, sentiment
 - Image, scene recognition
- Very Simple** user interface and use

Cool Search

AWS growth in Keynote

Figure Source: AWS re:Invent 2014 Day 1 Keynote with Andy Jassy



- Cool Search:** Nobel prize in Google Book
- Cool Search:** Summary of meeting Friday PM
- Cool Search:** GCP 2016 issue

Research Plan

- Study ML State of the Art (SOTA)
 - Academic research perspective
 - Start-ups perspective
- Study Text summarization
 - Abstractive, extractive
- Study Cloud APIs
- Build a Storm Sandbox
 - Cloud ingest optimization (RT)
 - Scalability, HA experiments
- Re-define Architecture
 - Definition: Knowledge Assistant
 - Simplify: + Open Source + Cloud
 - Metadata/associations
 - System output and search interface
 - Develop functional prototype

Results and Discussions

On-line: CS229; Machine Learning. Andrew Ng
 Study Multi-tenant architecture, micro-services

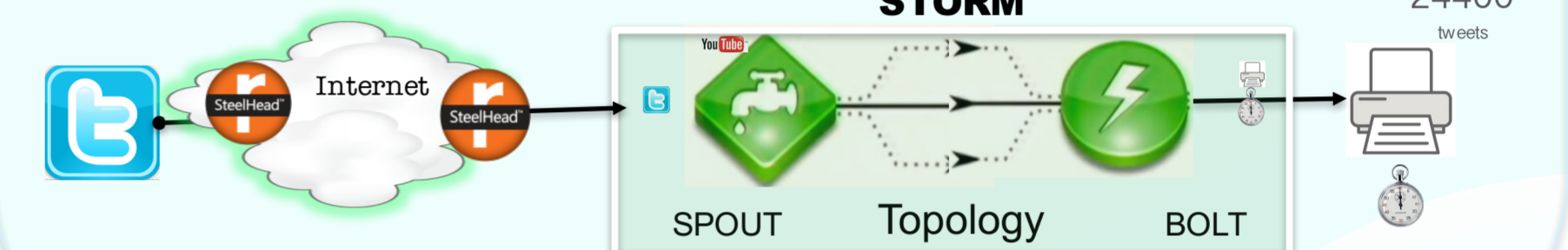
ML:= TensorFlow. Reasons

- Portability, any device: CPU, GPU, TPU, Mobile, Raspberry PI
- Fast: C++, compilation, sub-graph exec
- Scale: Google cloud, Distributed
- Open source to stay 4709 Commits 5 rel. 245 contributors

USE:

- Unsupervised classification, "field" generation
- Text summarization experiments

Twitter Ingest Optimization



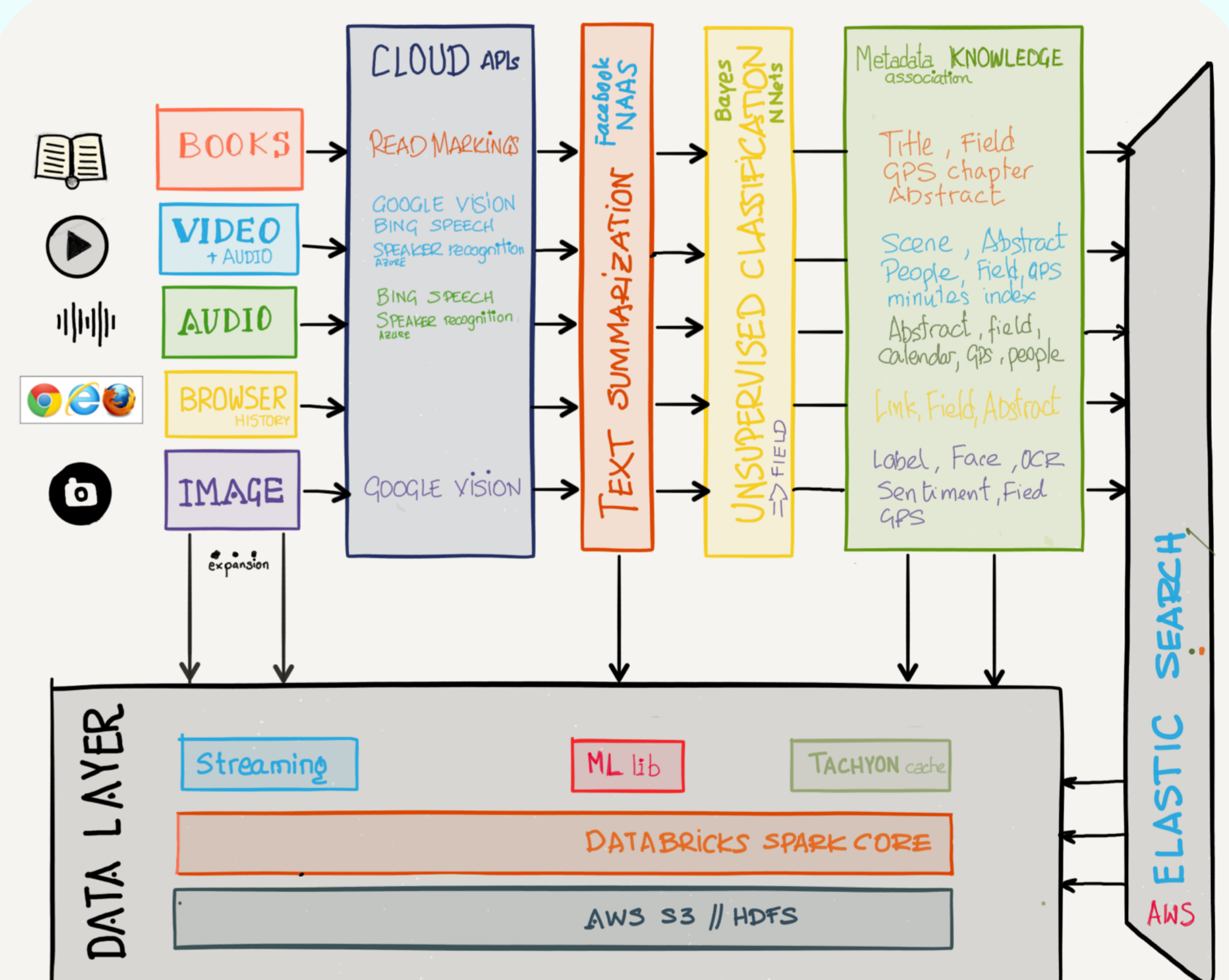
- Additional this year, study how to detect trends

USER interface



ARCHITECTURE re-definition: Cloud APIs

EMOTION API, databricks, VISION API



Next Year Planning

- Finish paper twitter ingest optimization
- Continue studying ML, Tensorflow Udemy
- End of SOTA research:= Implementation:
 - Cloud intelligence layer
 - Text summarization
 - Sparse FT for Spectral Clustering

References

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 [3] Martín A., A. A., P. B., E. B., Z. C., C. C., G. S. C., A. D., Jeffrey Dean, M. D., S. G., I. G., A. H., G. I., M. I., R. J., Y. J., L. K., M. K., J. L., D. M., M. S., ..., J. S., B. S., I. S., K. T., P. T., V. V., V. V., F. V., O. V., P. W., M. W., M. W., Y. Y., and X. Z.. "TensorFlow: Large-scale machine learning on heterogeneous systems", 2015. Software available from tensorflow.org.
 [4] Alexander M. Rush, Sumit Chopra, Jason Weston. "A Neural Attention Model for Abstractive Sentence Summarization" arXiv:1509.00685v2 [cs.CL] 3 Sep 2015
 [5] Krebs, Rouven, Christof Momm, and Samuel Kounev. "Architectural Concerns in Multi-tenant SaaS Applications." CLOSER 12 (2012): 426-431.