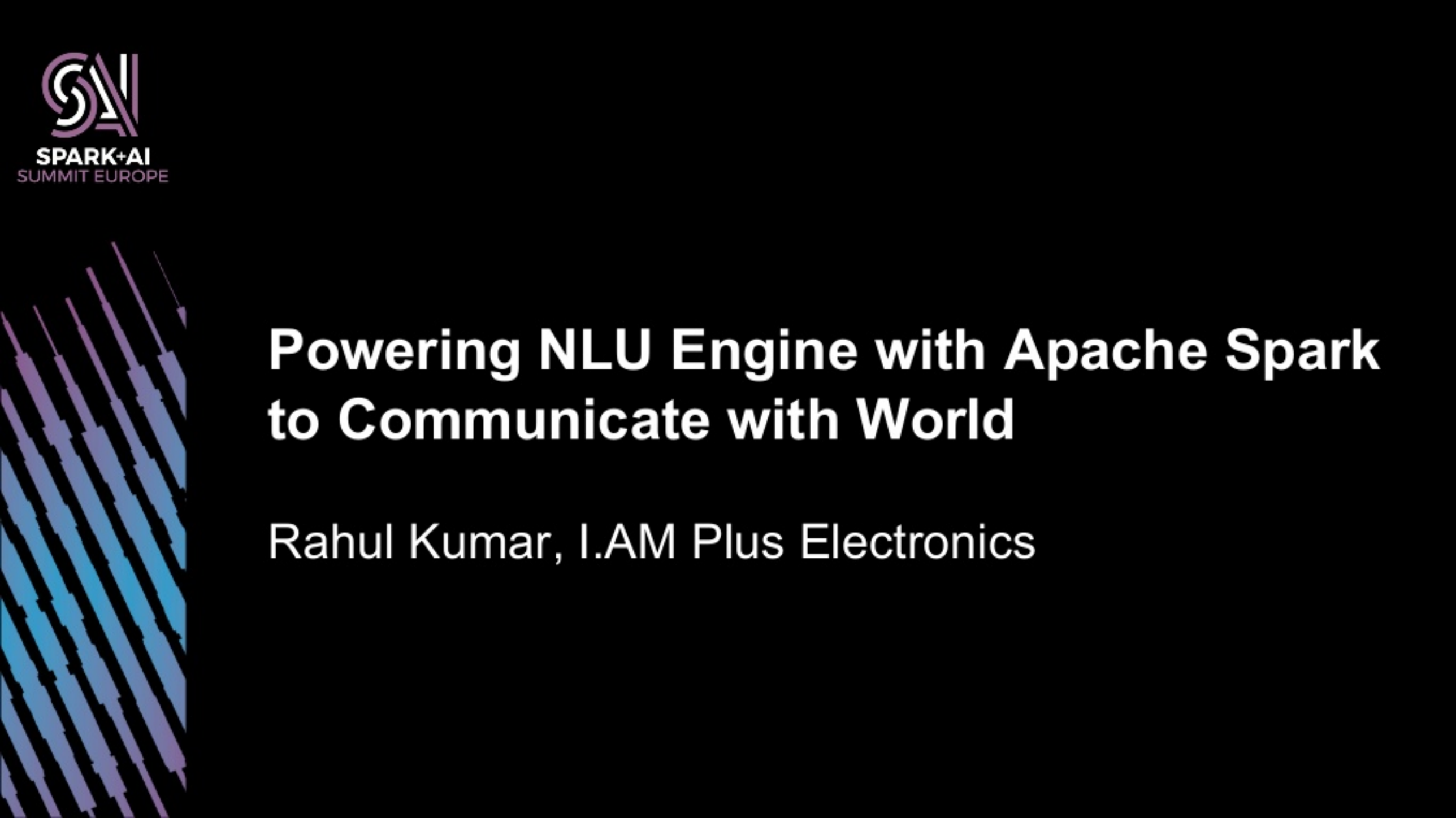


Powering NLU Engine with Apache Spark to Communicate with World

Rahul Kumar, I.AM Plus Electronics

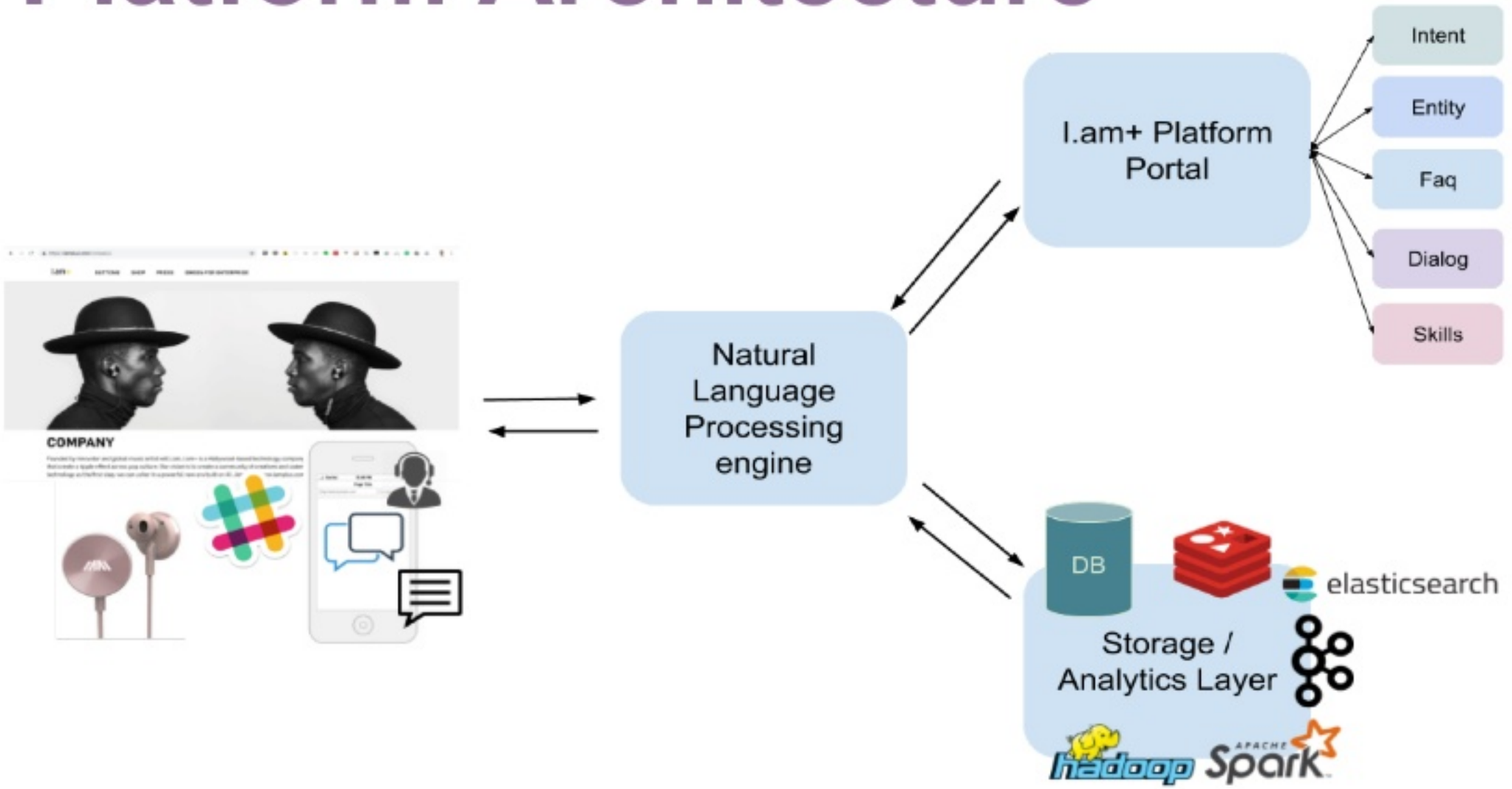
Agenda

- NLP platform features
- NLP Architecture
- NLP building blocks
- Deep learning for NLP
- TensorFlow Overview

NLP Platform Features

- Text & Voice based interaction
- 50K + Music
- Email / Calendar Integration
- News + weather
- Open API for various Skills

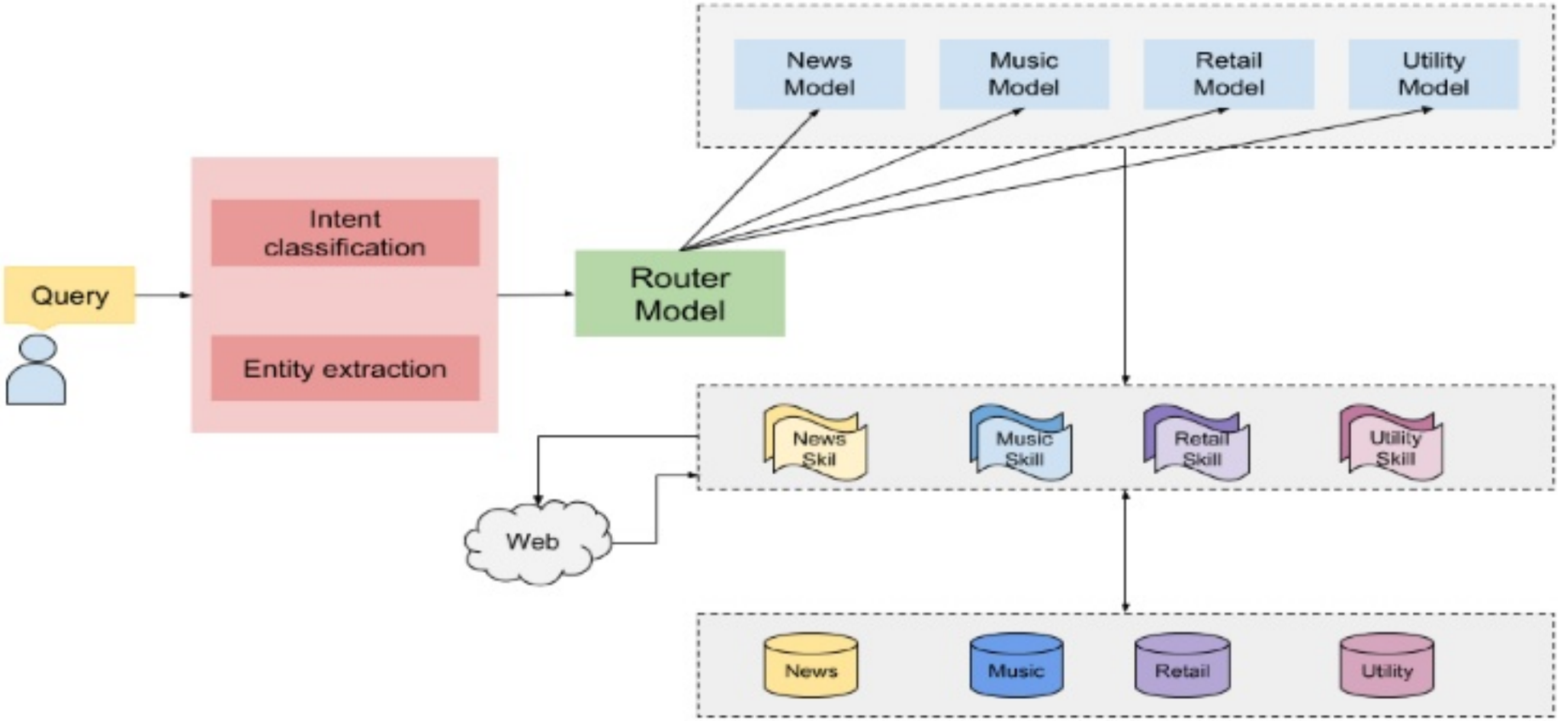
Platform Architecture

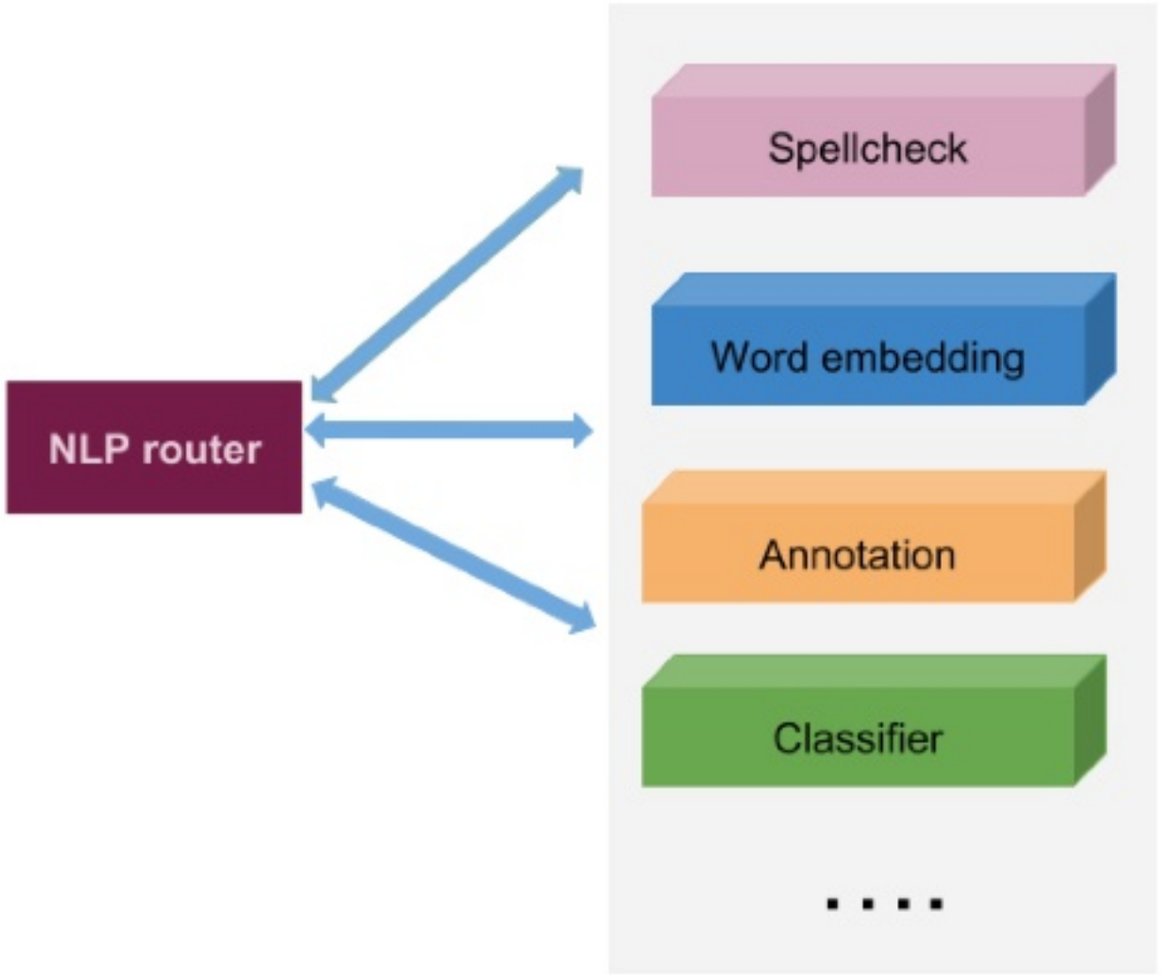


Core Building Blocks

- NLP/NLU engine
- Skills repository
- Data Processing & Analyzing
- User Interaction medium

Workflow


News Model
Music Model
Retail Model
Utility Model
Intent classification
Entity extraction
Query
Router Model
News Skil
Music Skill
Retail Skill
Utility Skill
Web
News
Music
Retail
Utility


NLP router
Spellcheck
Word embedding
Annotation
Classifier
. . . .

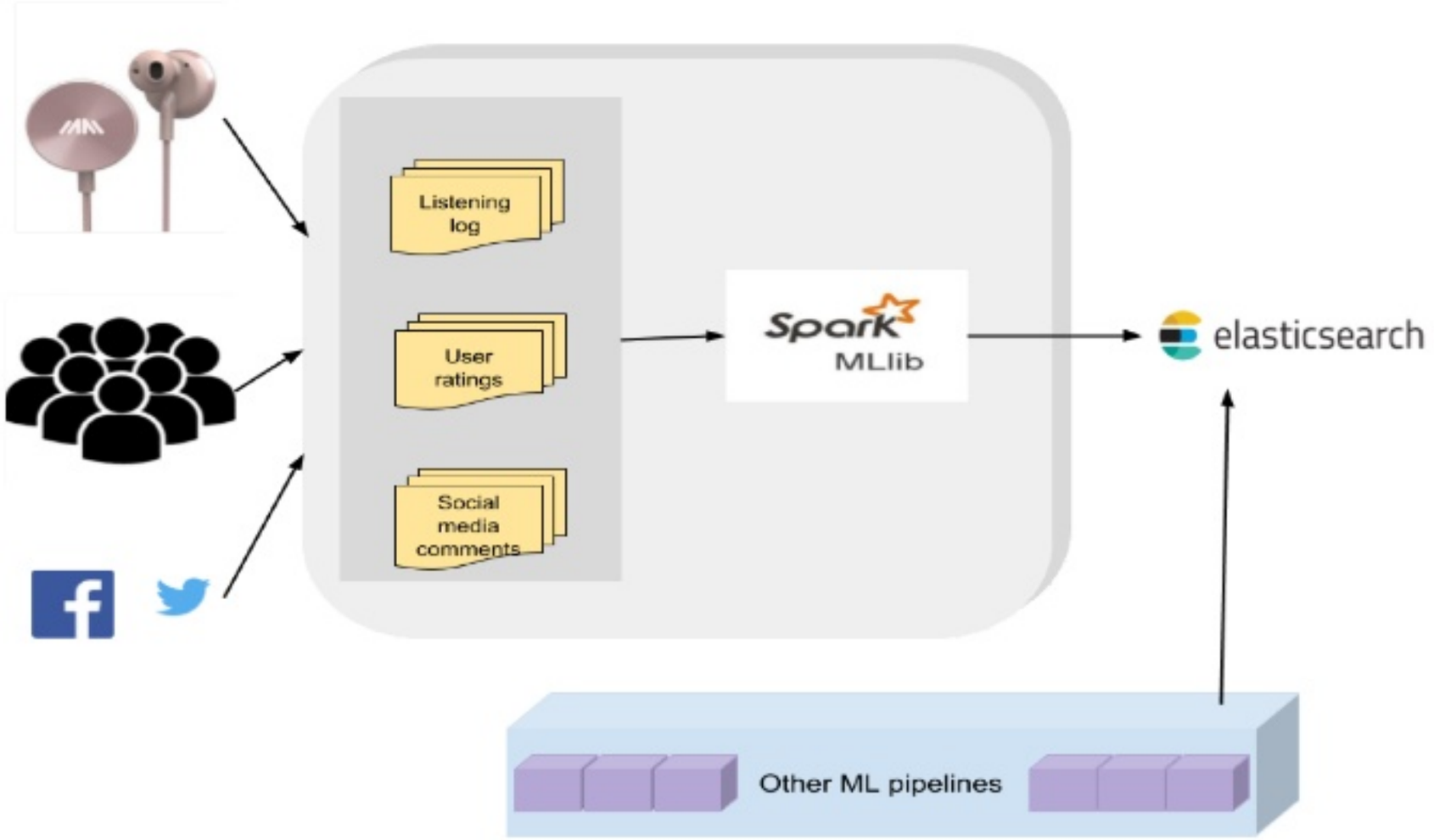
Data Challenges

- Heterogenous data type
- Streaming + Batch data
- Data Cleaning, enrichments
- Data Annotation

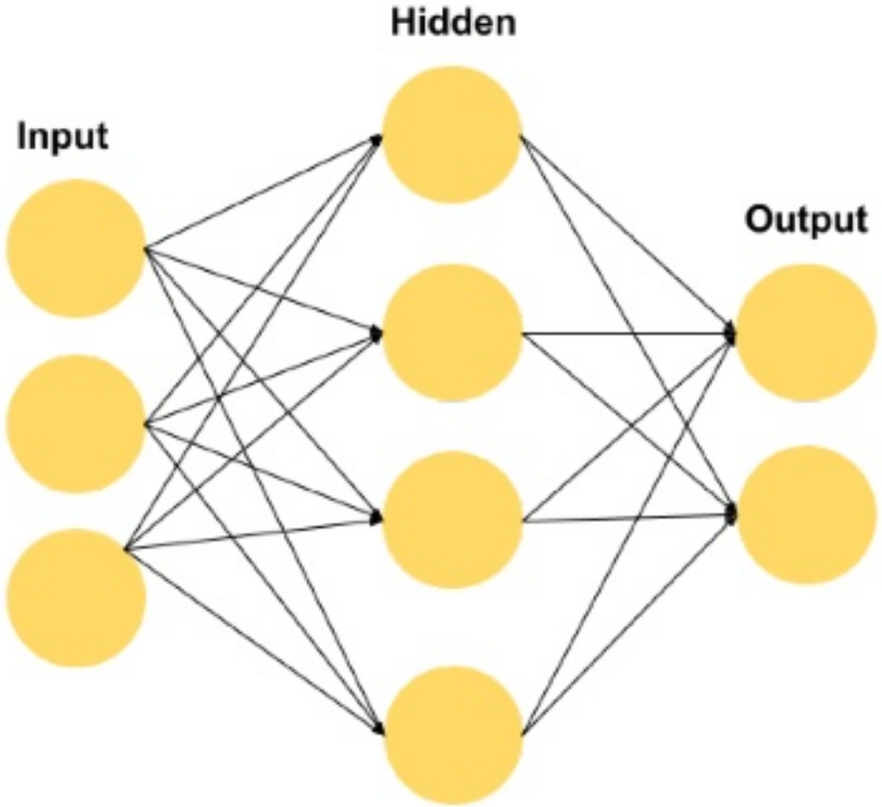
Spark MLlib

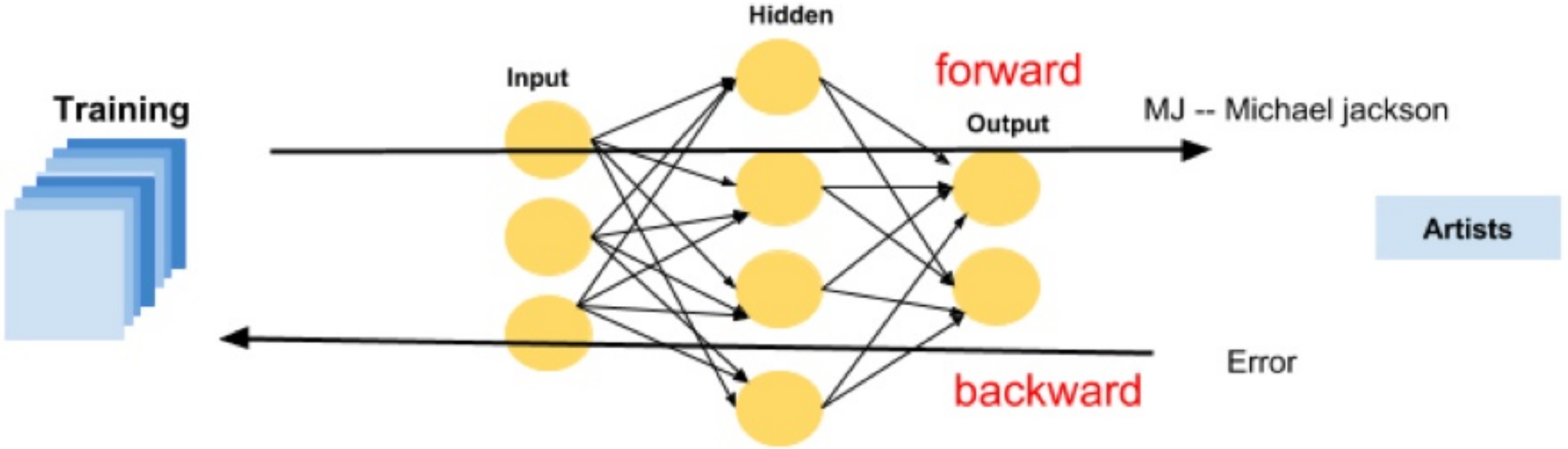
- Classification and Regression
- Clustering
- Collaborative filtering
- Frequent Pattern Mining

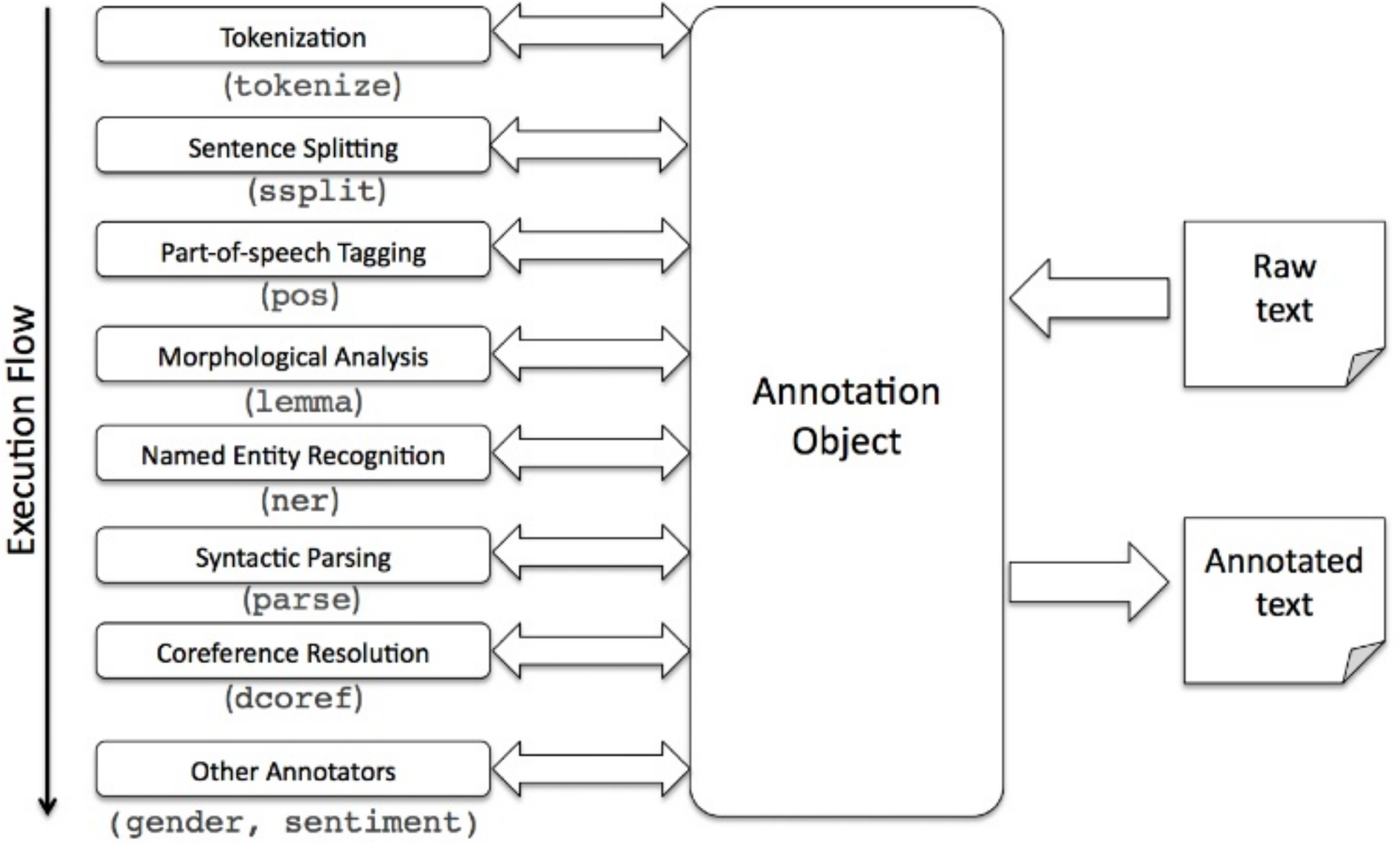
Data Pipeline on Scale



What is Deep learning?




Training
Input
Hidden
Output
forward
backward
MJ -- Michael jackson
Error
Artists


Execution Flow
Tokenization
(tokenize)
Sentence Splitting
(ssplit)
Part-of-speech Tagging
(pos)
Morphological Analysis
(lemma)
Named Entity Recognition
(ner)
Syntactic Parsing
(parse)
Coreference Resolution
(dcoref)
Other Annotators
(gender, sentiment)
Annotation Object
Raw text
Annotated text

Word embedding

- **Word embedding** is the collective name for a set of language modeling and feature learning techniques in natural language processing (NLP) where **words** or phrases from the vocabulary are mapped to vectors of real numbers

Word embedding model

- Word2Vec model
- Glove model
- fasttext model

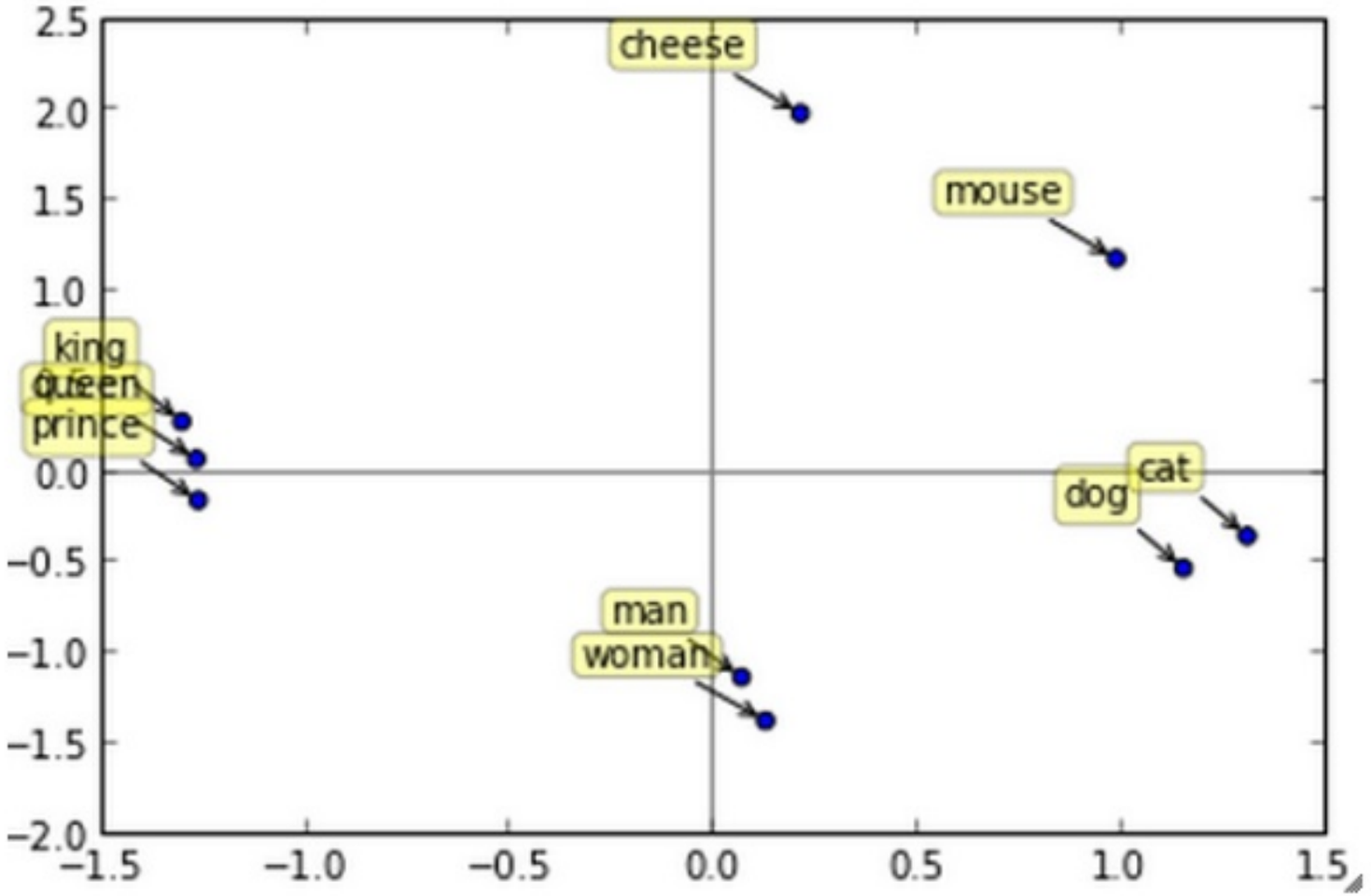
Idea for word2vec model

- Word similarity = vector similarity
- Key idea: Predict surrounding words of every word
- Faster and can easily incorporate a new sentence/document or add a word to the vocabulary
- Developed by Mikolov, Sutskever, Chen, Corrado and Dean in 2013 at Google Research

Representation

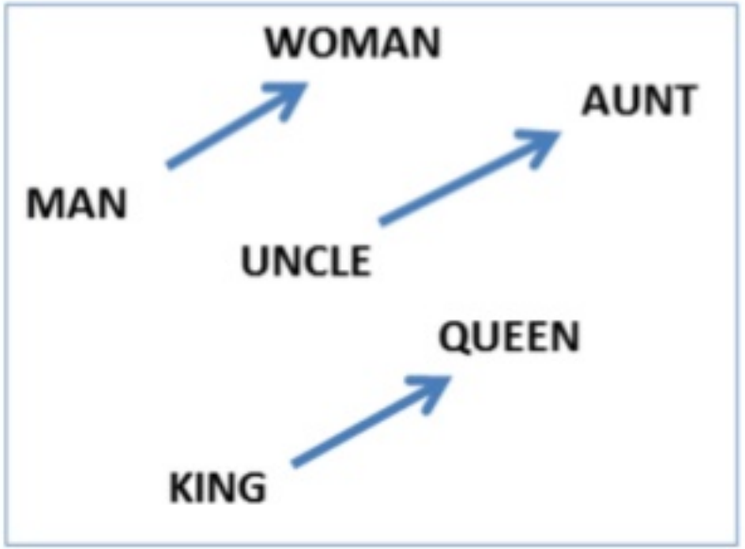
- Word meaning and relationships between words are encoded spatially
- Spatial distance corresponds to word similarity words are close together ⇔ their "meanings" are similar notation: word w → vec[w] its point in space, as a position vector.

Similar words are closer together

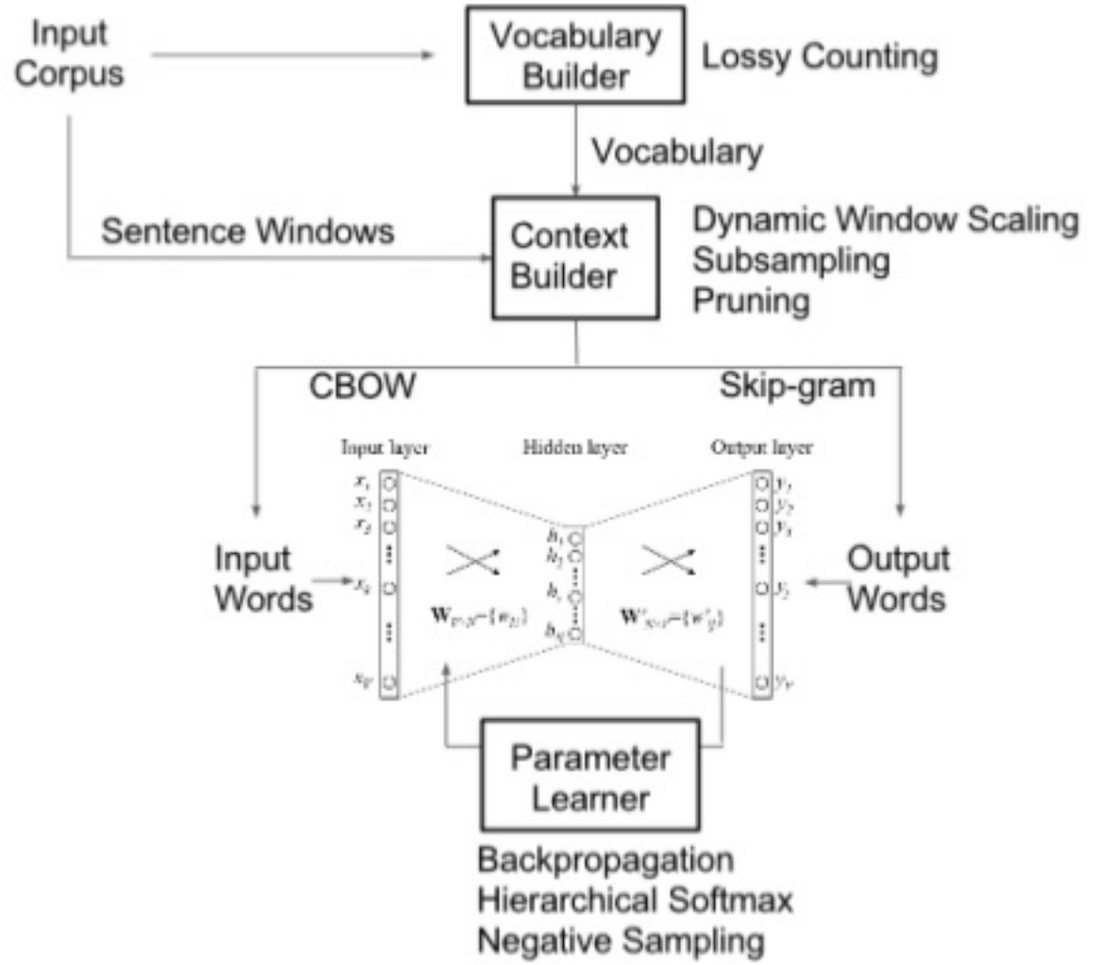


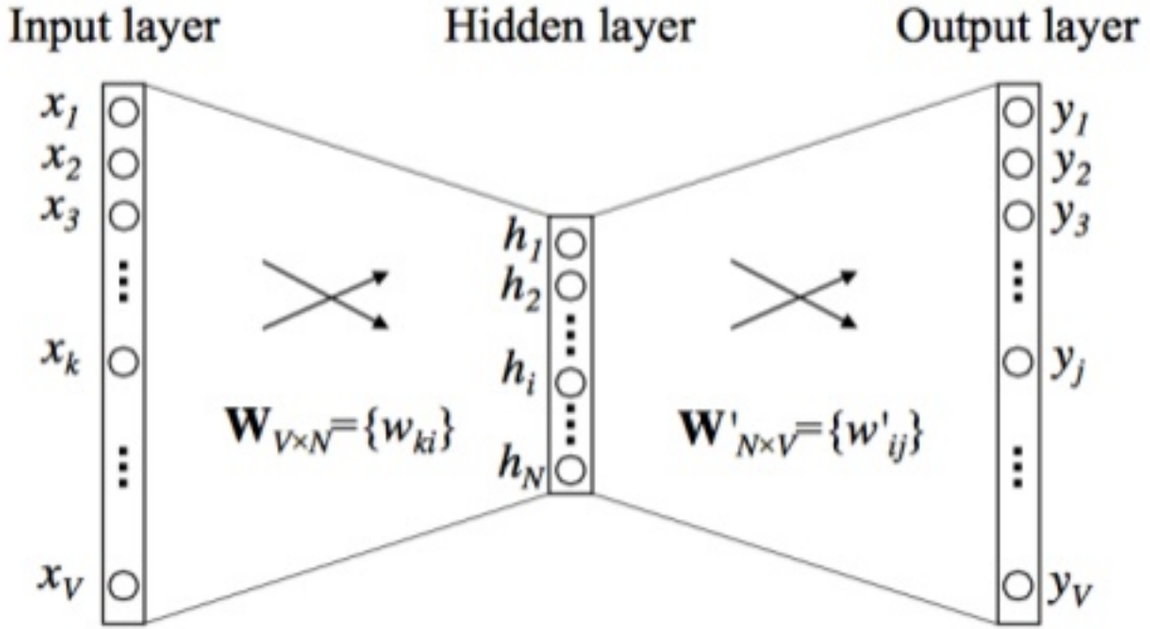
Word relationships are displacements

- The displacement (vector) between the points of two words represents the word relationship.
- Same word relationship ⇒ same vector



Architecture

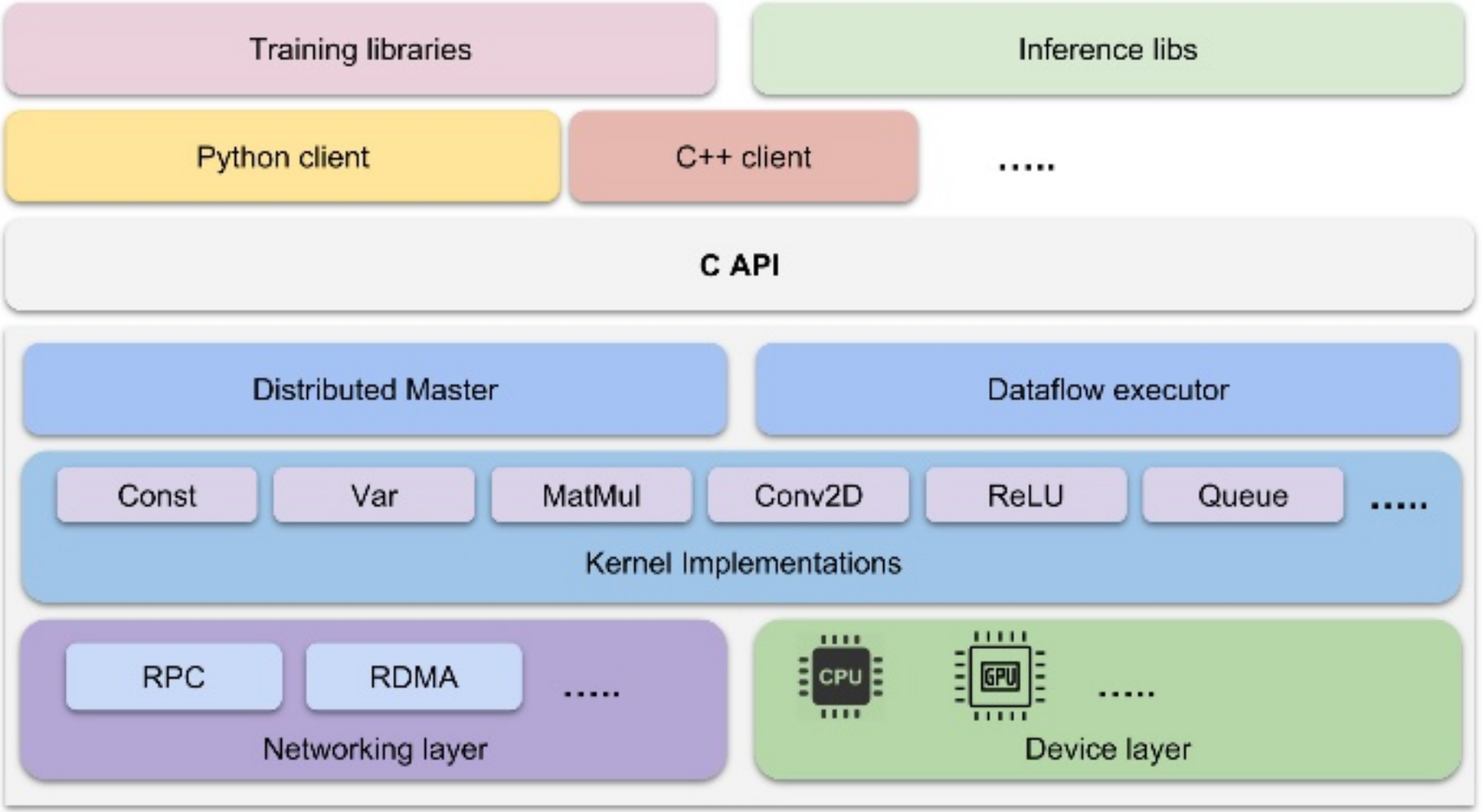


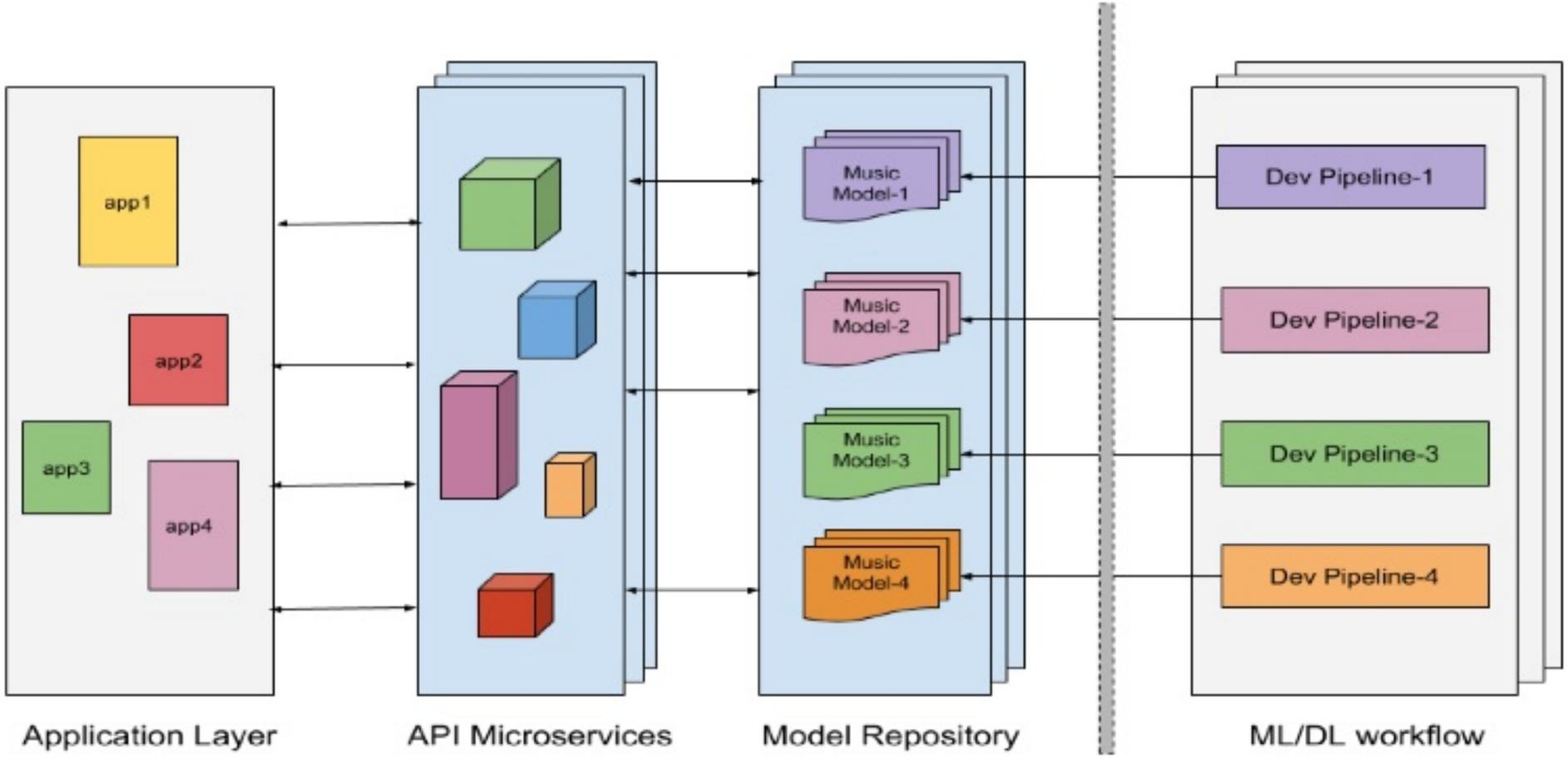


TensorFlow ™

- TensorFlow is an open-source machine learning library for research and production
- TensorFlow provides a variety of different toolkits that allow you to construct models at your preferred level of abstraction

TensorFlow architecture




app1
app2
app3
app4
Music Model-1
Music Model-2
Music Model-3
Music Model-4
Dev Pipeline-1
Dev Pipeline-2
Dev Pipeline-3
Dev Pipeline-4
Application Layer
API Microservices
Model Repository
ML/DL workflow

SPARK+AI SUMMIT EUROPE

Questions ?

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