Inside Facebook Algorithmic Factory

1,600,000,000

with 1,100+ employees, 300+ sites

4.5 x 3.1 x 17

350 x 4.7 x 10

17,930,000,000

Inside Facebook Algorithms Factory

Data Collection

Algorithms Processing

Targeting

300,000,000

media

wasting human lives
Inside Facebook Algorithmic Factory
Active users

1.600.000.000

With 1.6 billion active users in 2015 Facebook is heading towards their mission to connect every person on this planet through their social network.

Population:
China - 1,376,560,000
India - 1,288,970,000
United States - 323,473,000 (x5)
Serbia - 7,164,000 (x223)
1 billion
log into Facebook
every day

30 petabytes
used
300 petabytes of user data on Facebook each day.
4.5 billion Likes every day

3 million Likes per person
5 million Likes per minute
1 billion Location-tagged posts every day
350 million uploaded photos every day
0 Likes per minute

4.7 billion items shared each day

10 billion messages send each day

Location-tagged
Facebook revenue in 2015

17.930.000.000

This black box defines new forms of labour, exploitation and generation of enormous amount of wealth and power (17.93 Billion dollars in 2015) for the owners of this invisible immaterial factory creating deep economic gap between the ones who owns and control the means of production and their users who really often live below the poverty line.

\[
\frac{17.930.000.000}{5081.76} = 3.528.305
\]

x Annual wages in Serbia
423.48 $ \times 12 = 5081.76$

17,930,000,000 / 5081.76 =

3.528.305

x Annual wages in Serbia
Every of over 1 billion Facebook users / digital workers, work averagely 20+ minutes per day on liking, commenting, and scrolling through status updates. That is more than 300,000,000 working hours of free digital labour per day.

300,000,000

working hours per day
3 segments of our investigation:

Immaterial Factory: Transforming user labour into profit
Algorithmic filtering and moderation: Newsfeed algorithm
Policing and oppression in the State of Facebook: Cybernetic censorship
Investigation Tools

1. Data Collection
   - Facebook Data policy analysis
   - Mapping all the input fields on the Facebook platform
   - Cookies and pixel technology analysis at the 3rd party websites
   - Policy analysis of Facebook owned companies
   - Research on Facebook Vendors, service providers and other partners.
   - Facebook Ireland Ltd Report of Audit (2011)

2. Storage and data analysis
   - Facebook Patent database research
   - Facebook API

3. Targeting
   - Facebook Ad creation process
Device ID and call information

read phone status and identity

Contacts/Calendar

read your contacts
modify your contacts
read calendar events plus confidential information
add or modify calendar events and send email to guests without owners knowledge

Phone

write call log
read call log
directly call phone numbers

Other
Expecting a Baby

Likely To Engage in Politics (Conversative)
Likely To Engage in Politics (Liberal)
US Politics (Conservative)
US Politics (Liberal)
US Politics (Moderate)
US Politics (Very Conservative)
US Politics (Very Liberal)
Action Store

The action store maintains information describing actions by social networking system users internal to the social networking system, as well as actions performed via third party websites that communicate information to the social networking system. Users may interact with various objects maintained by the social networking system, and these interactions are stored in the action store. Examples of actions or interactions stored in the action store include: commenting on posts, sharing links, tagging objects, and checking-in to physical locations via a mobile device or other client device. Additional examples of interactions with objects on the social networking system included in the action store include: commenting on a photo album, transmitting messages to another user, joining an event, joining a group, becoming a fan of a brand page, creating an event, authoring an advertisement, using an application, interacting with an advertisement, and engaging in a transaction.

<table>
<thead>
<tr>
<th>User ID</th>
<th>Action</th>
<th>Time Format</th>
<th>Object ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>User ID</td>
<td>Like</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Share</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Comment</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Tag</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Check-In</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Message</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Join Event</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Join Group</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Create Event</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Using App</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Post</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Visit Page</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Interacting</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Follow Link</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Post link</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Add Friend</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Change Settings</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Visit website</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Comment on 3rd</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
<tr>
<td>User ID</td>
<td>Place</td>
<td>Time Format</td>
<td>Object ID</td>
</tr>
</tbody>
</table>

Content Store

The content store stores objects representing various types of content. Examples of content represented by an object include: a page post, a status update, a photo, a video, a link, a shared content item, a gaming application achievement, a check-in event at a local business, a brand page, or any other type of content. Objects may be acquired by users of the social networking system, such as status updates, photos tagged by users to be associated with other objects in the social networking system, events, groups or applications. In some embodiments, objects are received from third-party applications, which may be external to the social networking system. Content "items" represent single pieces of content that are represented as objects in the social networking system.
### Content Store

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### Edge Store

The edge store stores information describing connections between users and other objects on the social networking system as edges. Some edges may be defined by users, allowing users to specify their relationships with other users. For example, users may generate edges with other users that parallel the users' real-life relationships, such as friends, co-workers, partners, and so forth. Other edges are generated when users interact with objects in the social networking system, such as expressing interest in a page on the social networking system, sharing a link with other users of the social networking system, and commenting on posts made by other users of the social networking system. The edge store stores edge objects that include information about the edge, such as affinity scores for objects, interests, and other users. Affinity scores may be computed by the social networking system over time to approximate a user's affinity for an object, interest, and other users in the social networking system based on the actions performed by the user. Multiple interactions between a user and a specific object may be stored in one edge object in the edge store, in one embodiment. For example, a user that plays multiple songs from Lady Gaga's album, "Born This Way," may have multiple edge objects for the songs, but only one edge object forLady Gaga.
Social Graph

User Profile Store
Targeting based on Content

**Keywords**

The keyword selection engine selects candidate keywords associated with a content item using a topic extraction engine. The candidate keywords may be retrieved from a keyword store.

**Keyword Selection Engine**

- **Keyword Store**
- **Value Store**

**Value Calculation Module**

The value calculation module creates and updates the expected values stored in the value store or in the keyword store.

**Topics**

**User Topic Extractor**

Topic extraction engine identifies one or more topics associated with objects in the content store. To identify topics associated with content items, the topic extraction engine identifies anchor terms included in a content item and determines a meaning of the anchor terms.

**Taxonomy**

- **Outline**
- **Startups**
- **Firms**

**Groups and Subgroups**

**Sub-group Formation Module**

A seed user selection module gathers information about potential seed users of the social networking system to generate a seed cluster of users that share a selected affiliation, interest, or characteristic.
Identifying content in electronic images

Tracking source and usage of a media asset

Systems and methods for image classification by correlating contextual cues with images

Social data recording

Systems and methods for measuring user affinity in a social network environment

Systems and methods for social mapping

Determining influence in a social networking system

Targeting based on social connections
Systems and methods for social mapping

Determining influence in a social networking system

Targeting based on social connections

Targeting based on events

Routine Estimation

Pattern labeling
Routine Estimation

Determining geo-location centroids of geo-location clusters
Grouping geo-location centroids into groups
Determining time-based routine based on a number of geo-locations centroids within each group

Pattern labeling

Grouping ambient-location updates

Inferring household income for users of a social networking system

Receive information from user profiles, posted content and external sources about users
Select predictive factors to develop regression models predicting the income distribution of users by income brackets
Generate a regression model based on a series of correlation values corresponding to the selected predictive factors
Determine a coefficient for each of the selected predictive factors based on the information about users
Define ranges of each income bracket based on the distribution of the users using the regression model and coefficients

Comparing Financial Transactions of User To Financial Transactions Of Other Users
Comparing Financial Transactions of User To Financial Transactions Of Other Users

Transaction Analysis Engine
- Retrieve transaction history associated with the user
- Retrieve characteristics associated with user by social networking system
- Select characteristics associated with user
- Identify additional users having one or more selected characteristics
- Retrieve transaction histories associated with additional users
- Provide comparison

Financial Account Store
A seed user selection module gathers information about potential seed users of the social networking system to generate a seed cluster of users that share a selected affiliation, interest, or characteristic.

Associating cameras with users
Camera Identification Module
- Receive images associated with a user
Your transactions are compared to other users having an age within a threshold of your age, in your current location, and sharing your interests.

A user selection module gathers information about potential user users of the social networking system with social data inferred for given groups of users that share a selected affiliation, interest, or characteristic.

**Associating cameras with users**

Images uploaded by users of a social networking system are analyzed to determine signatures of cameras used to capture the images. A camera signature comprises features extracted from images that characterize the camera used for capturing the image, for example, faulty pixel positions in the camera and metadata associated with the images. Associations between users and cameras are inferred based on actions related to users captured by a camera, for example, users uploading images, users being tagged in images captured with a camera, and the like.

**Statistics for Continuous Location Tracking**

GPS

Continuously collect location information

Upload collected location information

Store information in raw form

Extract statistics and features

GPS

Store information in raw form

Extract statistics and features

Locate the

Time
Diagram: Facebook Algorithmic Factory

Data Collection

Storing Information

Algorithmic Processing

Targeting

Connections