Comparing Apples to Androids

Discovery, Retrieval, and Matching of iOS and Android Apps for Cross-Platform Analyses

Jakob Bleier | jakob.bleier@seclab.wien
Magdalena Steinböck | magdalena.steinboeck@seclab.wien
TU Wien, Vienna, Austria

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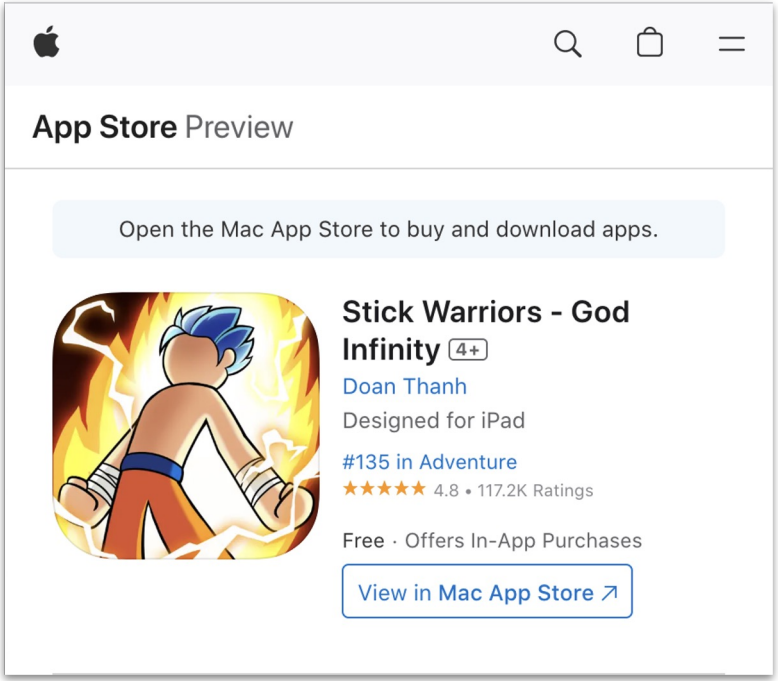
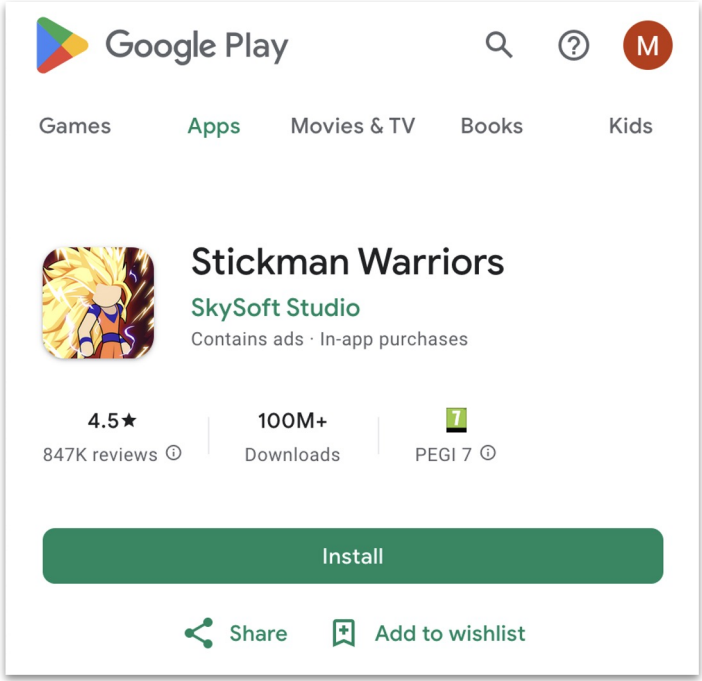
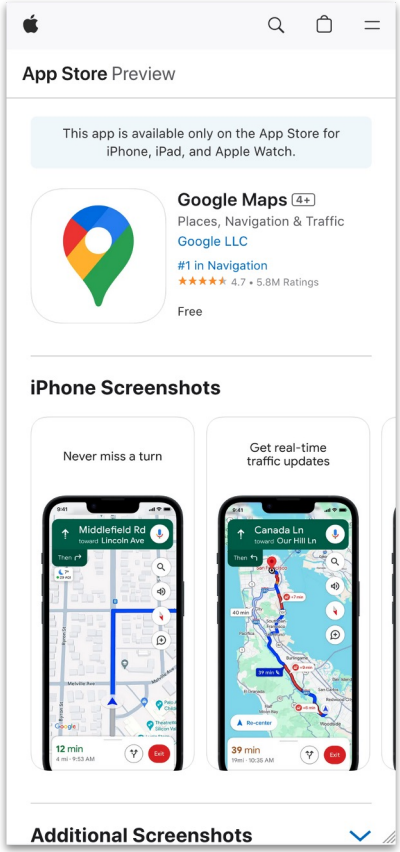
Motivation

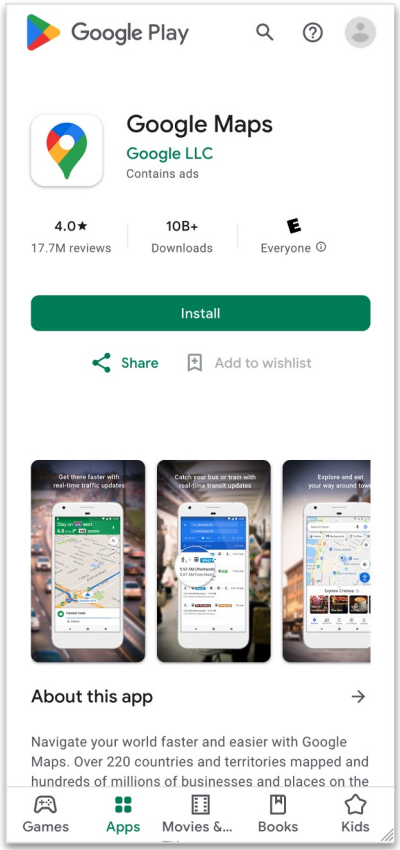

App Store Preview
Open the Mac App Store to buy and download apps.
Stick Warriors - God Infinity 4+
Doan Thanh
Designed for iPad
#135 in Adventure
4.8 • 117.2K Ratings
Free · Offers In-App Purchases
View in Mac App Store


Google Play
Games
Apps
Movies & TV
Books
Kids
Stickman Warriors
SkySoft Studio
Contains ads · In-app purchases
4.5★
847K reviews
100M+
Downloads
PEGI 7
Install
Share
Add to wishlist

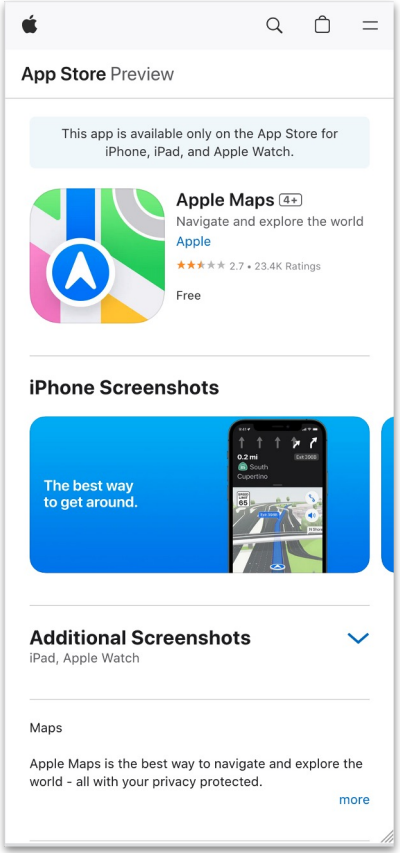
App Stores

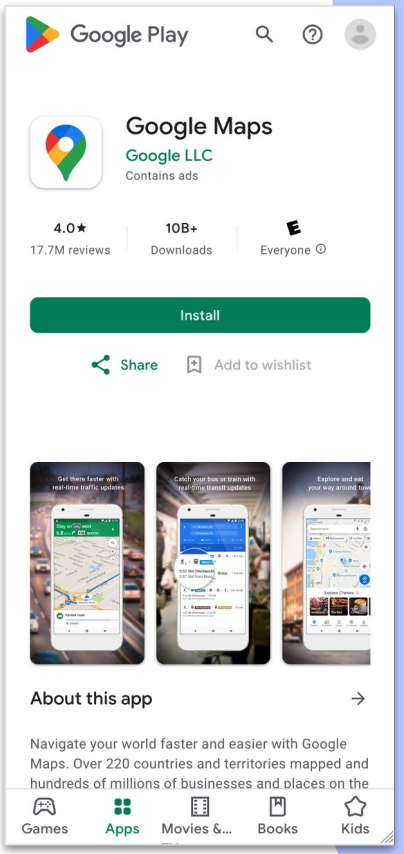
What does “same” mean?





VS.

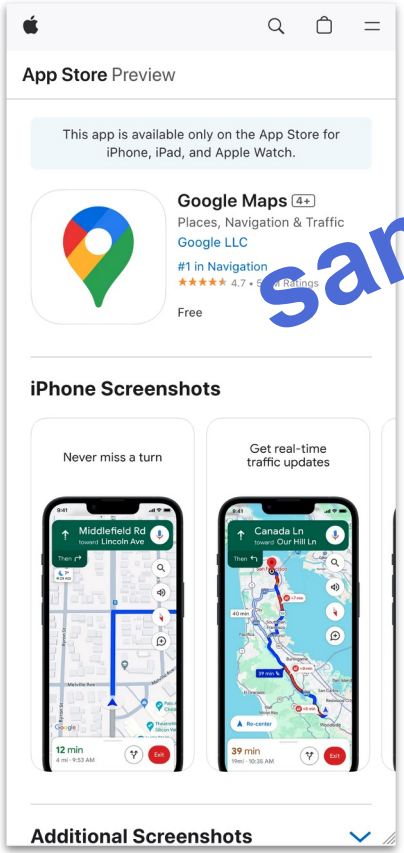


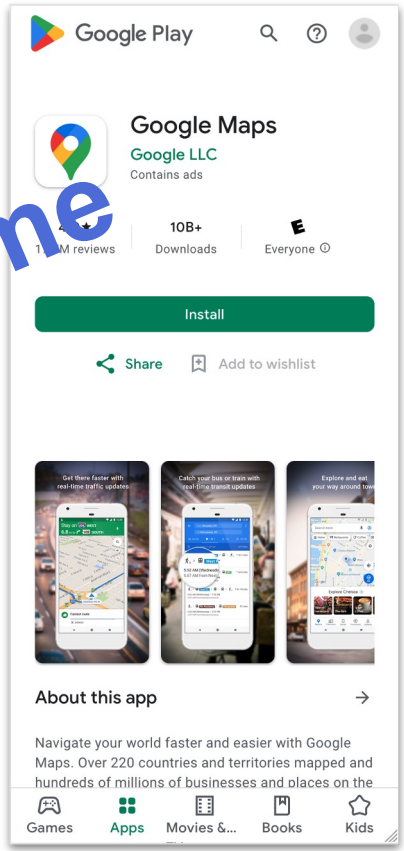


What does “same” mean?

“Comparing Apples to Oranges” Problem

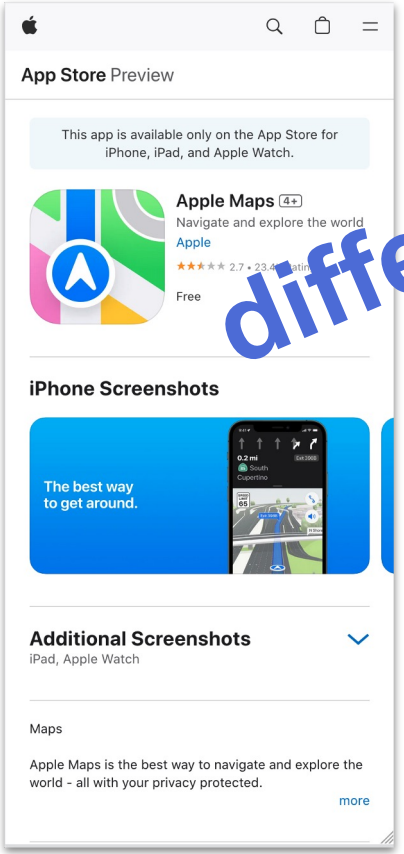
What does “same” mean?

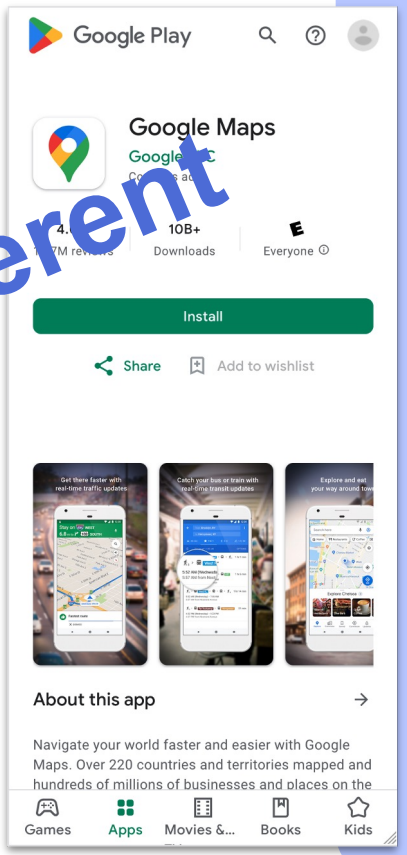




same

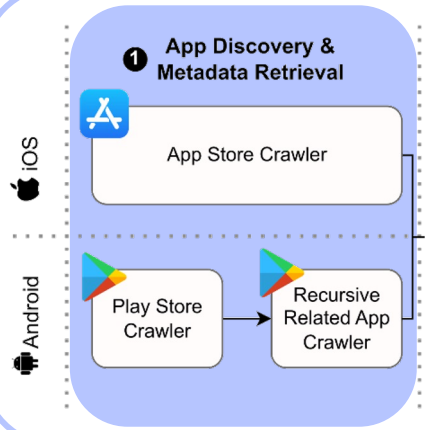
vs.





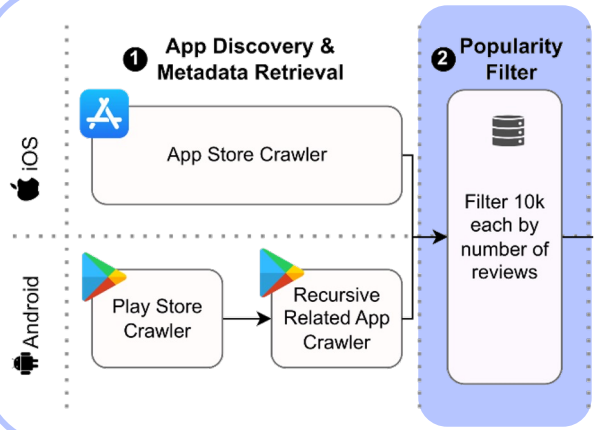
different

Architecture



- Discover Apps
- Download Metadata

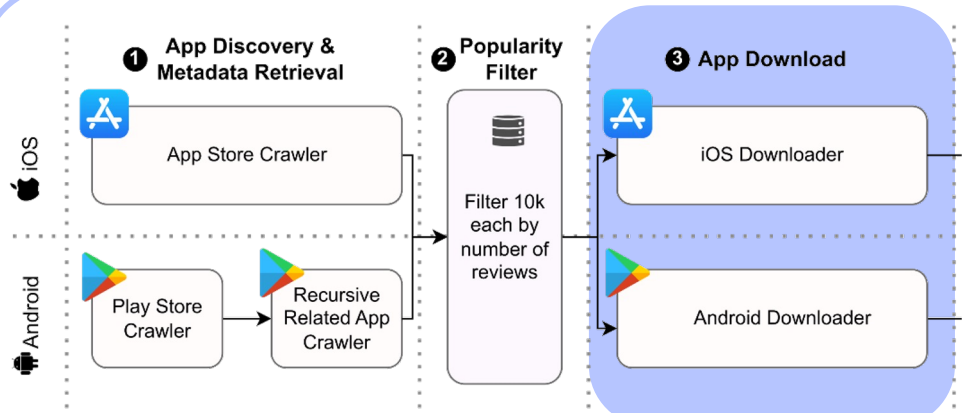
Architecture



- Get all free apps
- Sort them by their number of user ratings (desc.)
- Get first 10k apps for Android and iOS

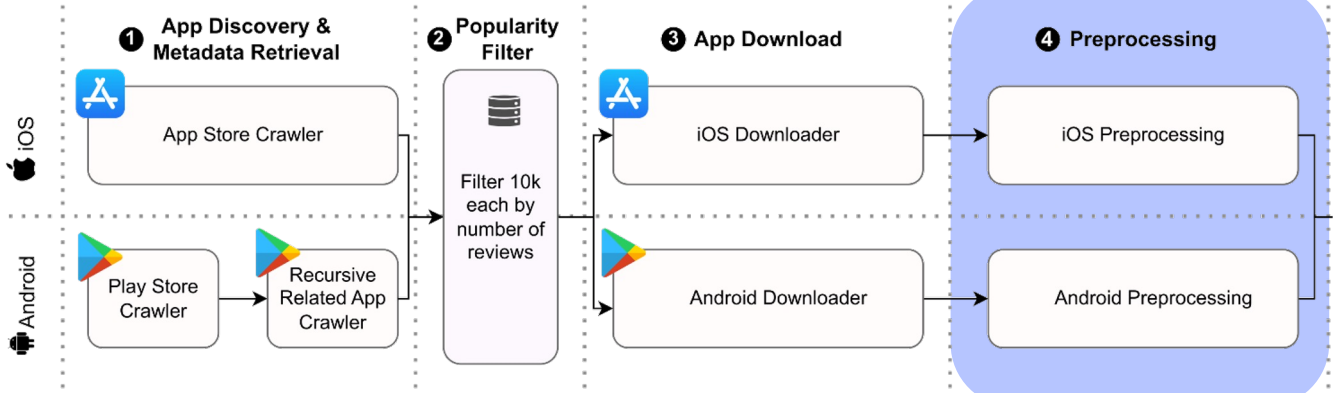
MongoDB®

Architecture



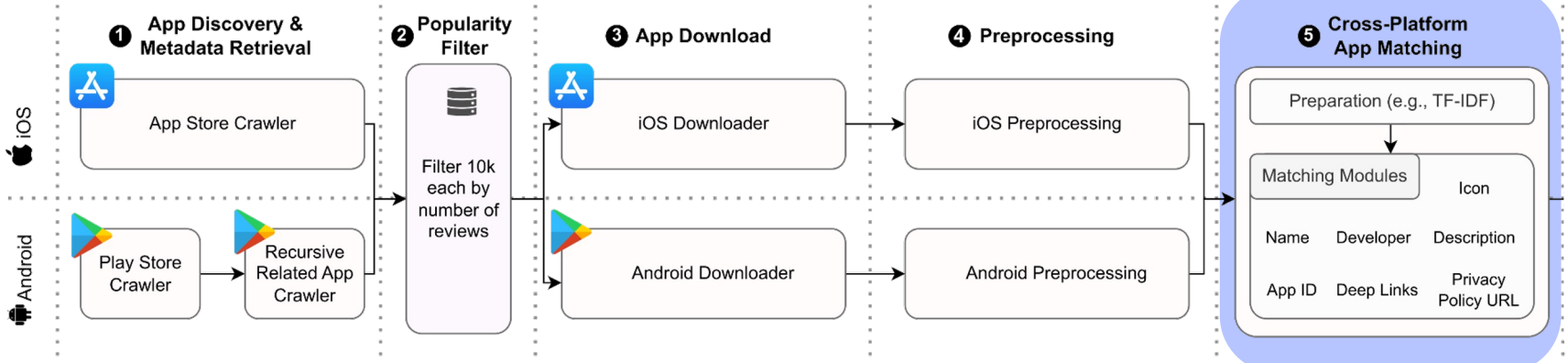
- Download Apps
- Download Metadata (again)

Architecture



- Perform preprocessing steps for each app

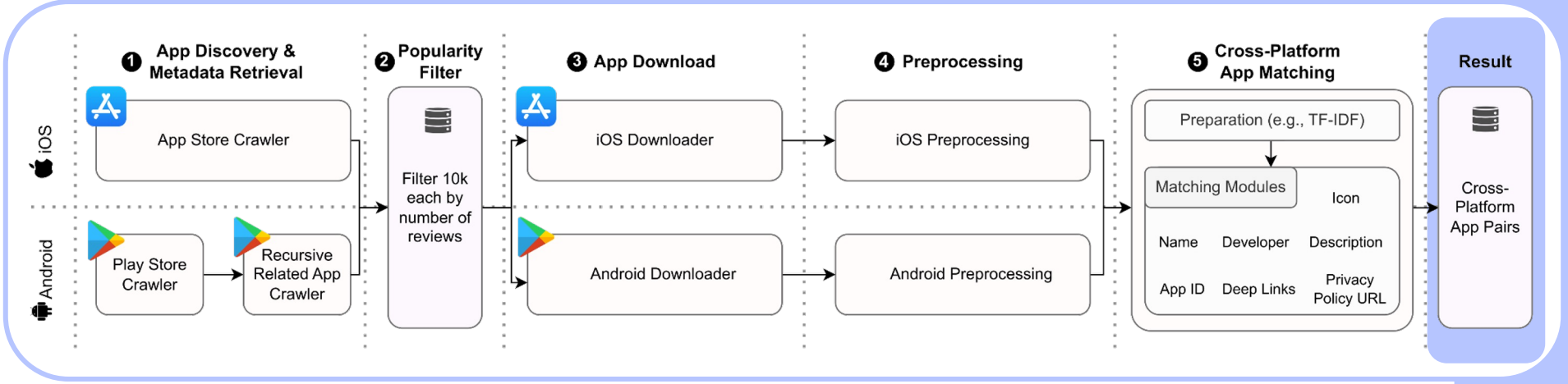
Architecture



Match each iOS app with each Android app

- Preparation
- Matching
- Scoring

Architecture



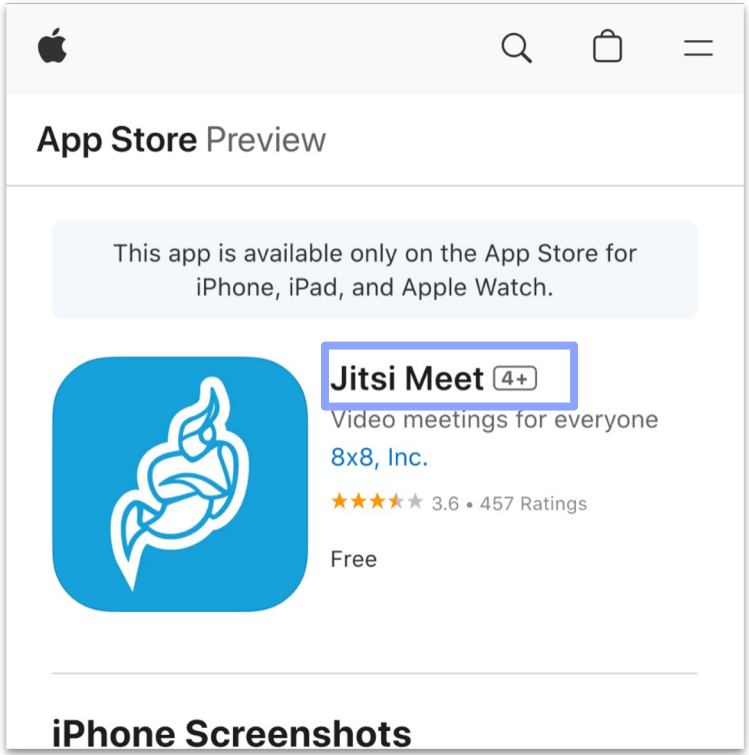
Perform aggregation to get

- For each iOS app
- The Android app with the highest average matching score

MongoDB®

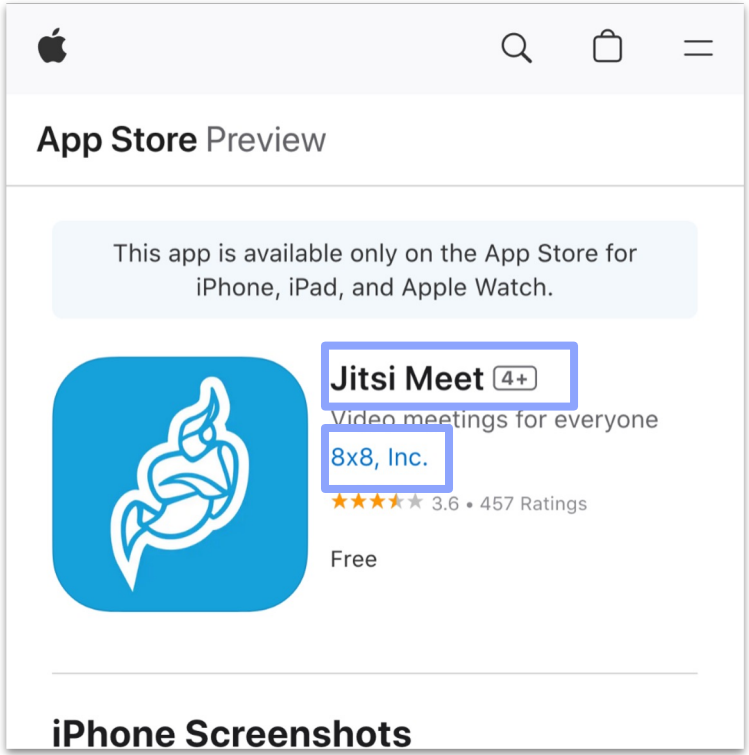
Matching Details

- App Name



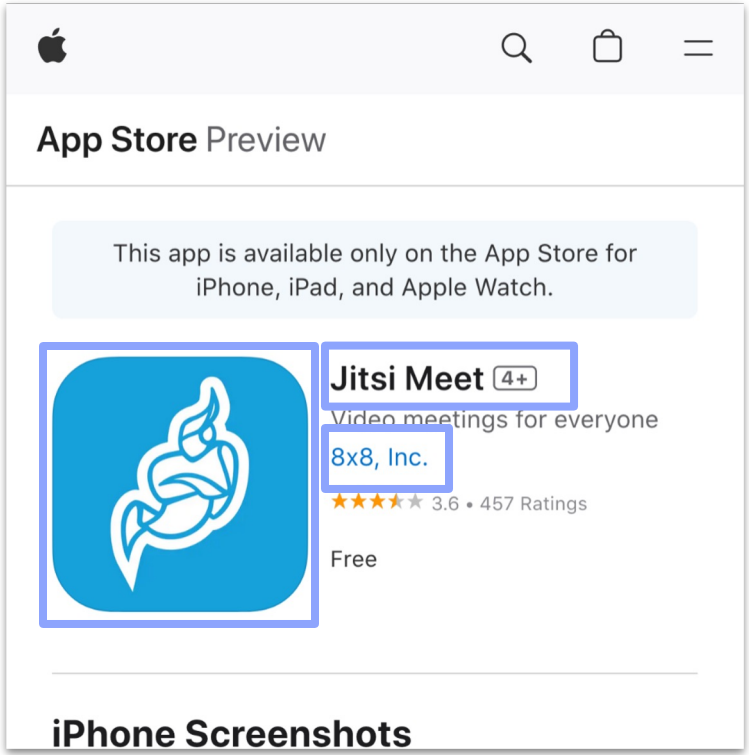
Matching Details

- App Name
- Developer Name



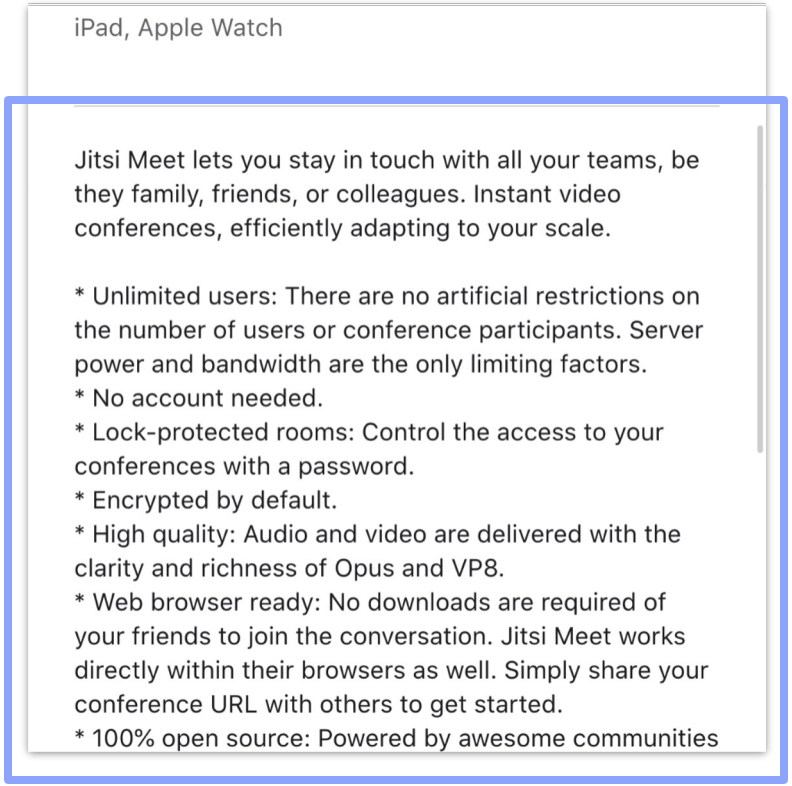
Matching Details

- App Name
- Developer Name
- App Icon



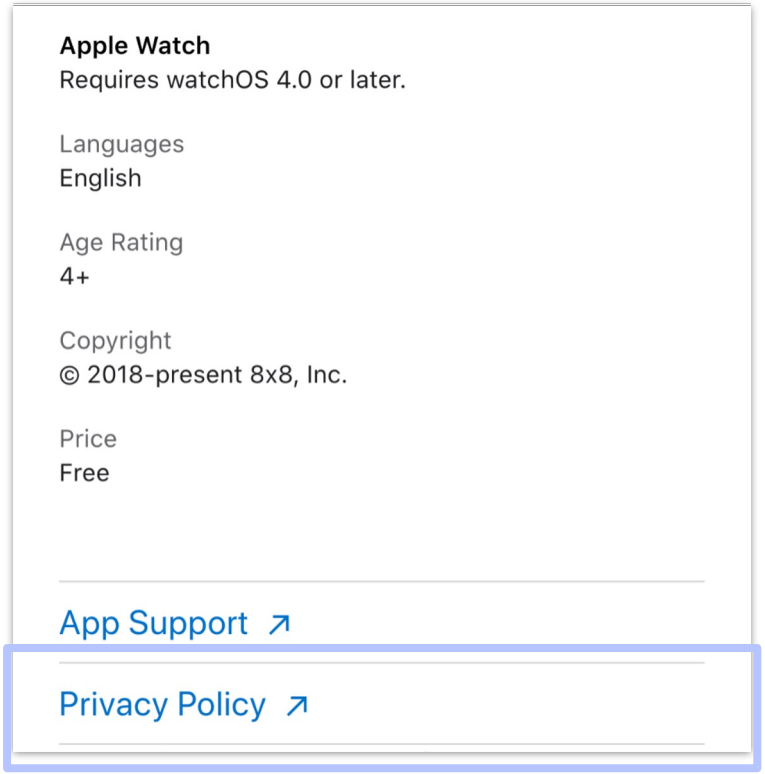
Matching Details

- App Name
- Developer Name
- App Icon
- App Description



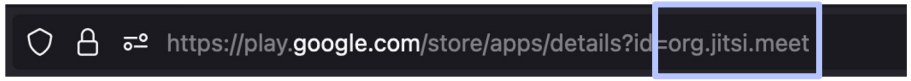
Matching Details

- App Name
- Developer Name
- App Icon
- App Description
- Privacy Policy URL



Matching Details

- App Name
- Developer Name
- App Icon
- App Description
- Privacy Policy URL
- App ID



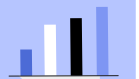
Matching Details

- App Name
- Developer Name
- App Icon
- App Description
- Privacy Policy URL
- App ID
- Deep Links

Results

9,943 iOS apps x 9,942 Android apps

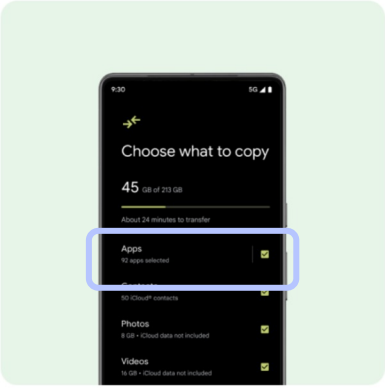
≈ 100,000,000 comparisons



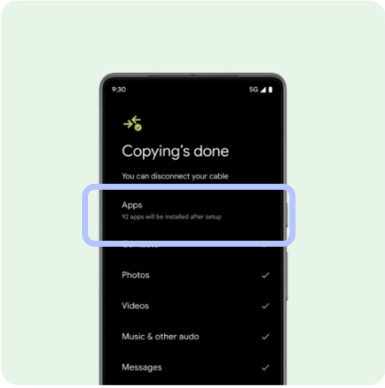
Google Migration API

Contacts | Photos and videos | Calendar events | Messages & WhatsApp chats | **Apps** | Music | And more

1. Connect both devices.

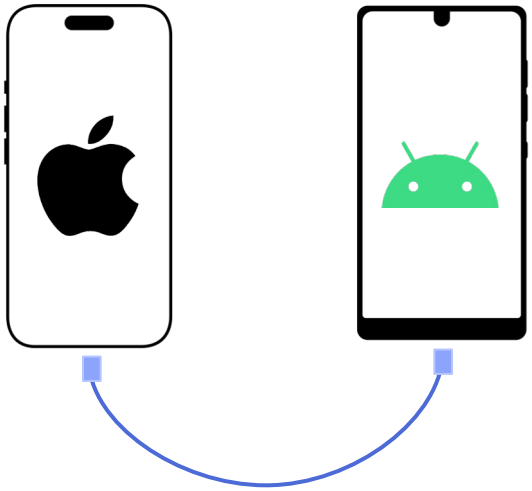


2. Select your data.

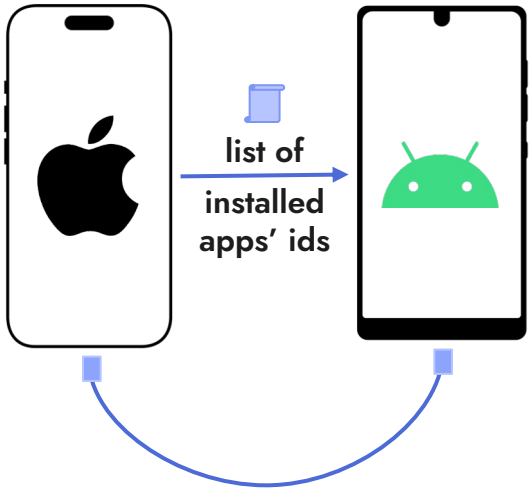


3. Transfer.

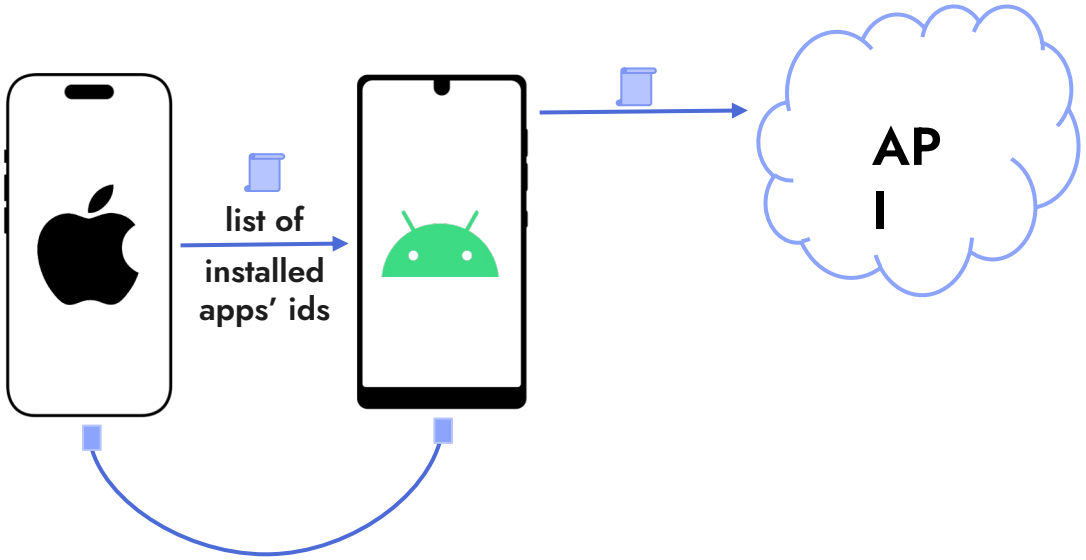
Google Migration API



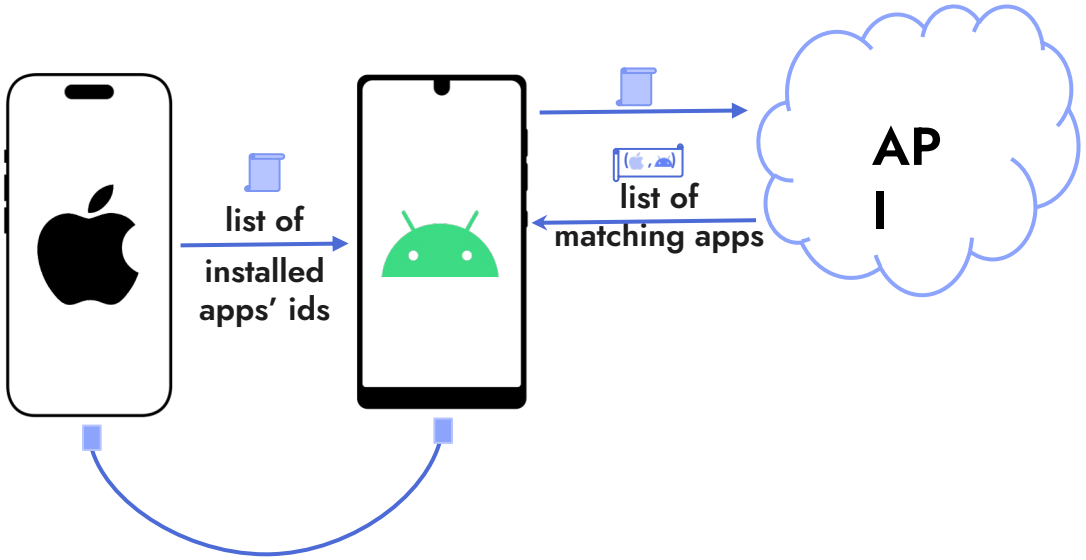
Google Migration API



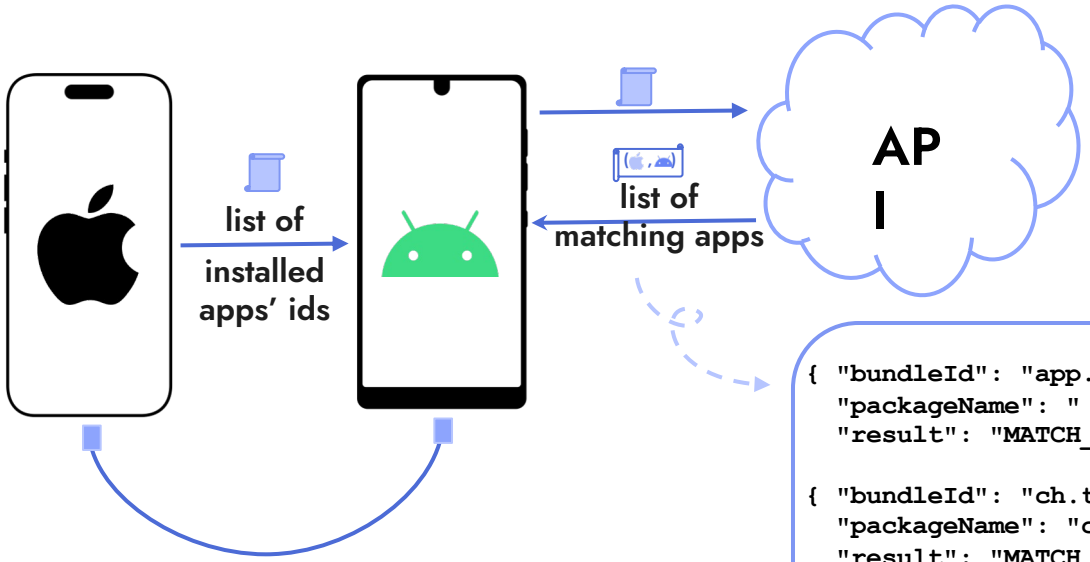
Google Migration API



Google Migration API



Google Migration API

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{ "bundleId": "ch.threema.iapp",
  "packageName": "ch.threema.app",
  "result": "MATCH_PAID"},

{ "bundleId": "com.rockwellventures.woah",
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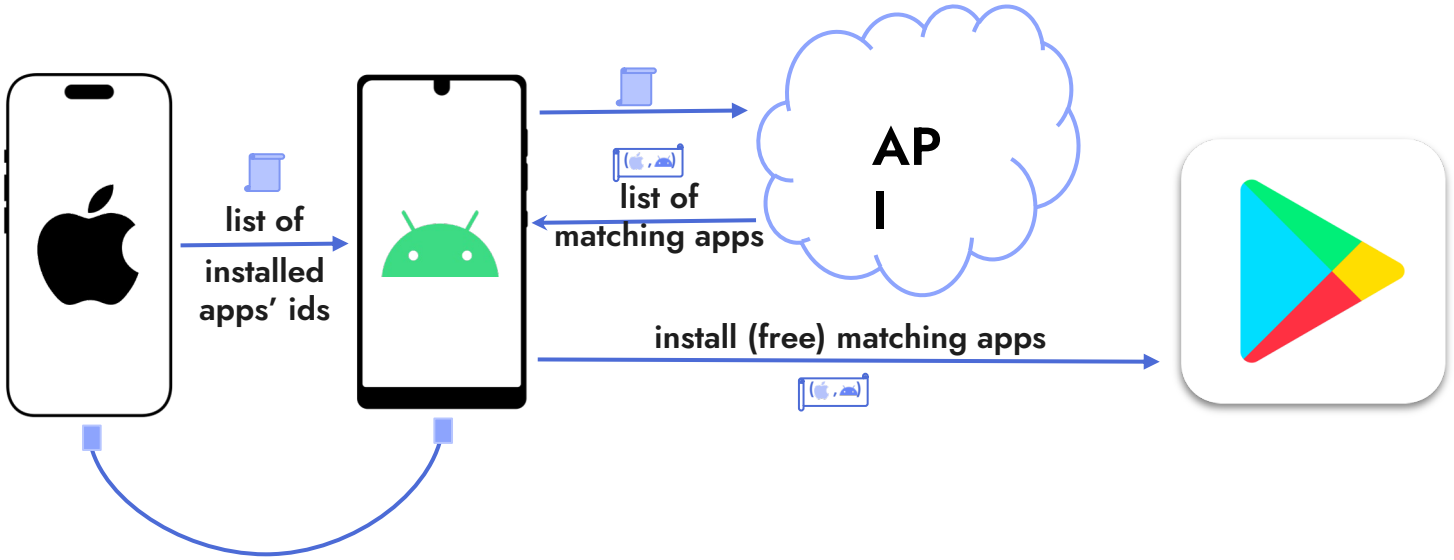
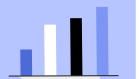
Google Migration API



Results

9,943 iOS apps x 9,942 Android apps

≈ 100,000,000 comparisons



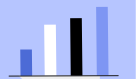
Results

9,943 iOS apps x 9,942 Android apps

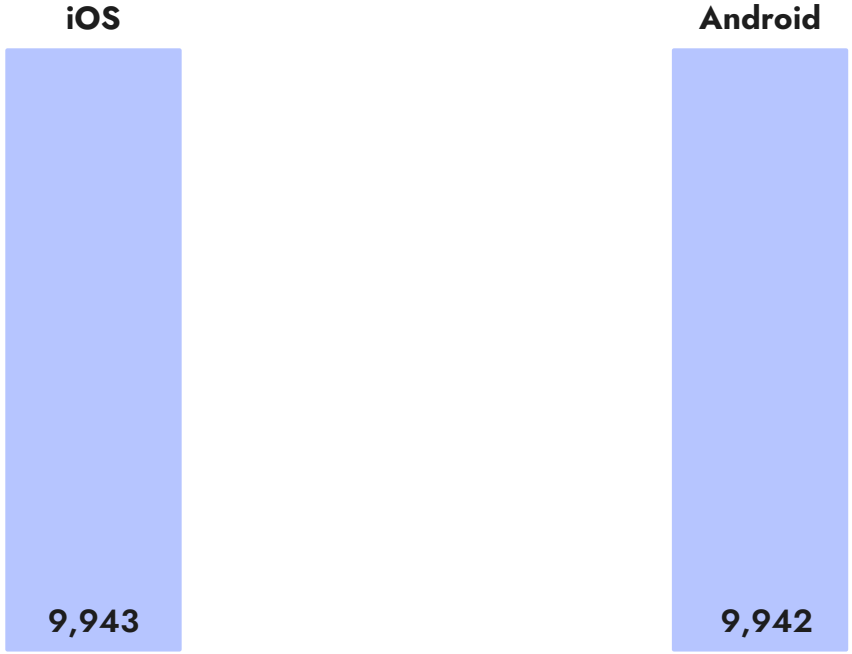
≈ 100,000,000 comparisons

Mapping of 1 iOS app to 1 Android app → 9,943 app pairs

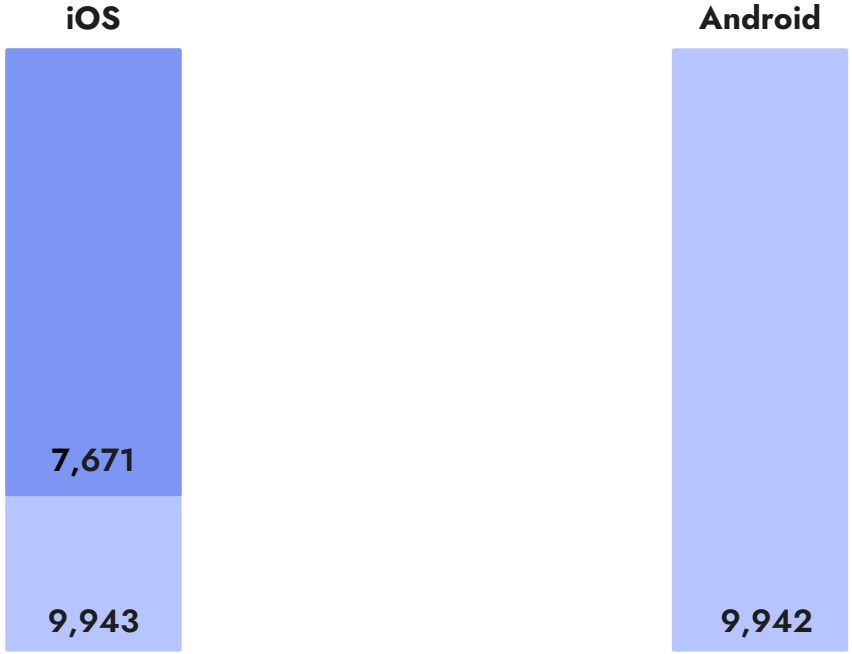
Validation against reference pairs (RP) obtained from Google Migration API



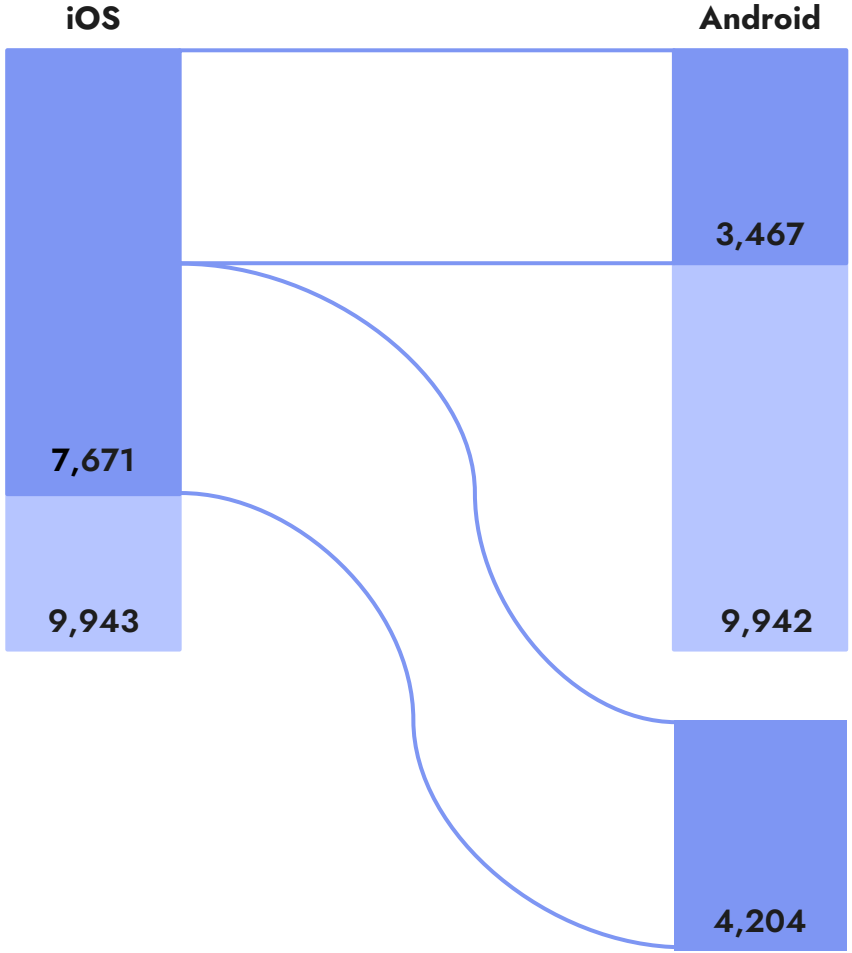
Dataset



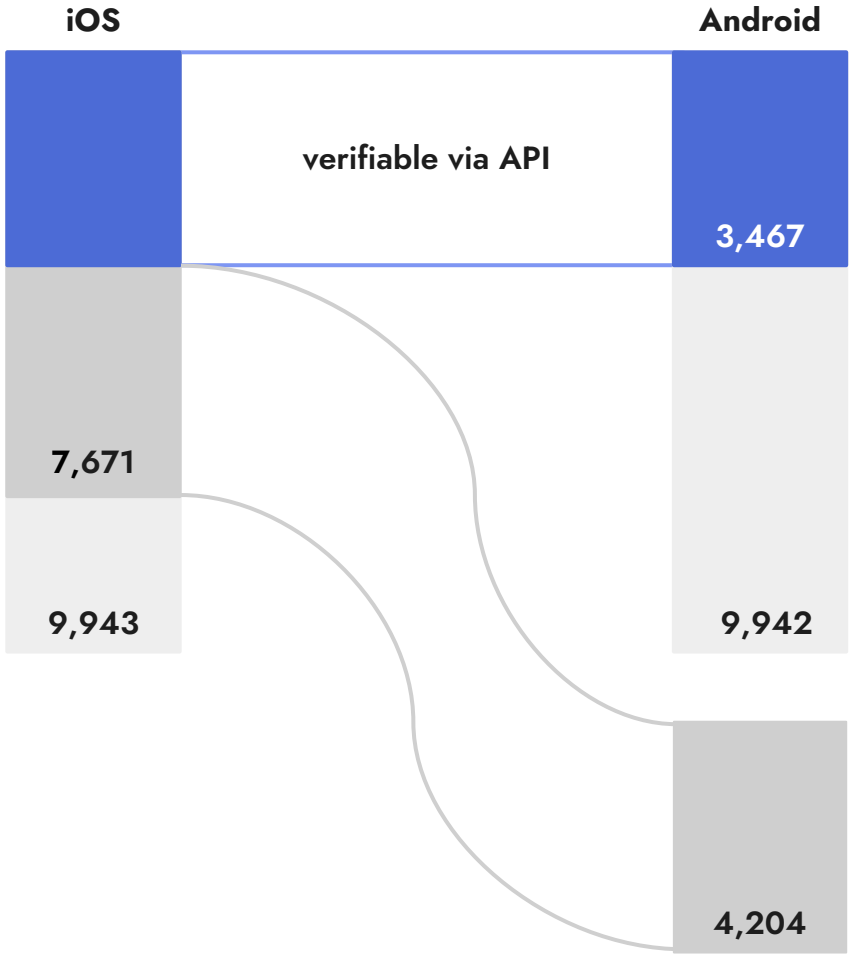
Dataset



Dataset



Dataset



Results

Approach	TP (%)	FP (%)	FN (%)
Our Approach	3,322 (95.82 %)	14 (0.40 %)	131 (3.78 %)

Comparison to previous Research

Approach	TP (%)	FP (%)	FN (%)
Our Approach	3,322 (95.82 %)	14 (0.40 %)	131 (3.78 %)
Hu et al. [1]	2,908 (83.88 %)	303 (8.74 %)	256 (7.38 %)
Kollnig et al. [2]	1,781 (51.37 %)	403 (11.62 %)	1,283 (37.01 %)
Ali et al. [3]	588 (16.96 %)	0 (0.00 %)	2,079 (59.97 %)
Han et al. [4]	514 (14.83 %)	0 (0.00 %)	2,953 (85.17 %)

Check out our Code!

- High matching rate
- Fast
- Modular

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Feature Ablation Study

Feature (Sub)Set	TP (%)	FP (%)	FN (%)
All seven features	3,322 (95.82 %)	14 (0.40 %)	131 (3.78 %)
w/o Deep Links	3,391 (97.81 %)	27 (0.78 %)	49 (1.41 %)
w/o Developer Name	3,341 (96.37 %)	18 (0.52 %)	108 (3.12 %)
w/o Description	3,279 (94.58 %)	36 (1.04 %)	152 (4.38 %)
w/o App Name	3,258 (93.97 %)	35 (1.01 %)	174 (5.02 %)
w/o App ID	3,250 (93.74 %)	19 (0.55 %)	198 (5.71 %)
w/o Privacy URL	3,206 (92.47 %)	7 (0.20 %)	254 (7.33 %)
w/o App Icon	3,173 (91.52 %)	20 (0.58 %)	274 (7.90 %)