AWS Mobile Web Day

24th March 2016

Hosted by AWS Technical Evangelists, Danilo Poccia & Ian Massingham

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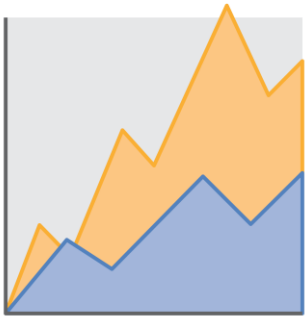
Analyze Mobile App Data and Build Predictive Applications

Sandeep Atluri, Data Scientist, AWS Mobile

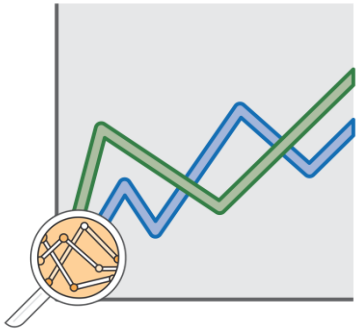
“If you can’t measure it ,you can’t improve it”

-Lord Kelvin

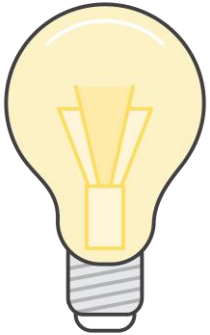
Three Types of Data Driven Development



Retrospective
reporting to analyze trends and to know what's happening in the business

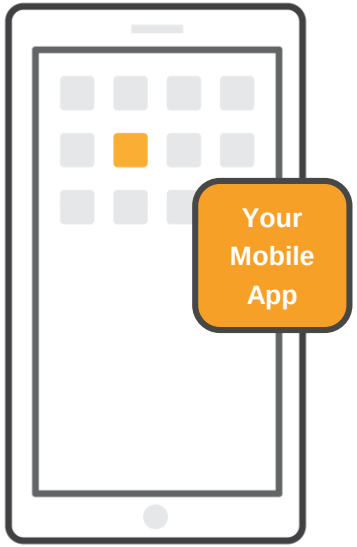


Inquisitive
pattern finding to discover latent user behavior and to frame strategies accordingly



Predictive
applications to anticipate user behavior and to enhance experience

In the Context of a Mobile App

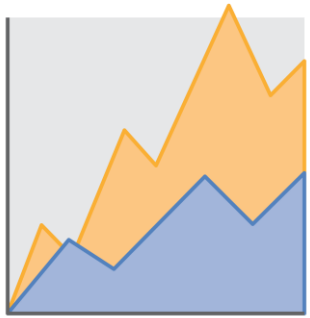


How many users use the app and how often?

What are key user behaviors in the app?

How to predict user behavior and use those predictions to enhance their experience ?

THREE TYPES OF DATA DRIVEN DEVELOPMENT



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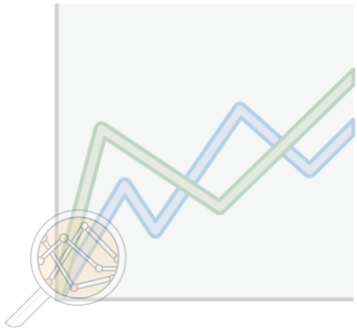

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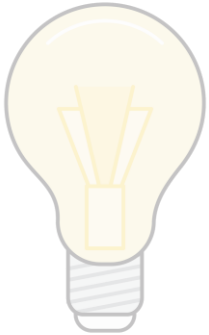

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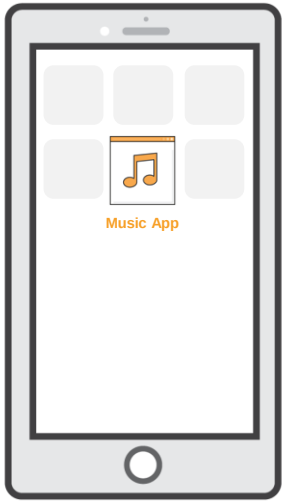
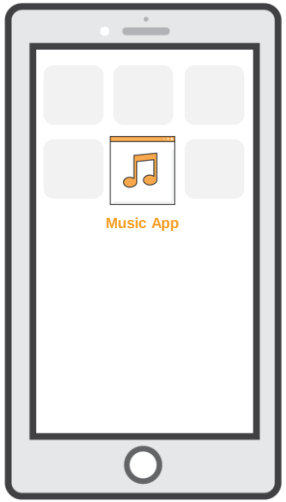


Let’s just say you have built a music app



Let’s just say you have built a music app

What are some of the questions that would help you analyze trends in the app?

Few Key Questions to Analyze Trends in the App

1

Engagement

How many users use the app daily to listen music ?

How many new users have been acquired to the app ?

How many times users open the app to listen music in a day?

2

Monetization

How many paying users does the app have ?

How much does a average paying user pay ?

3

Retention

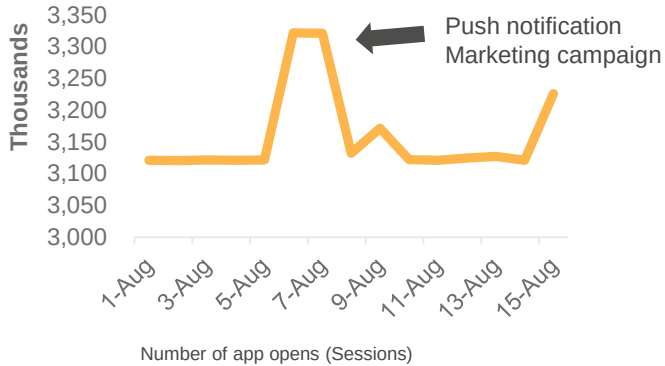
How many people returned to listen music in the first 7 days after they have installed the app ?

4

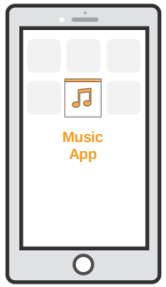
Behavioral

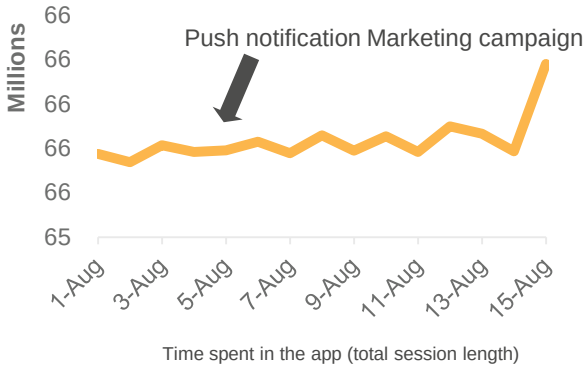
How many users shared or liked a particular artist ?

1 Engagement



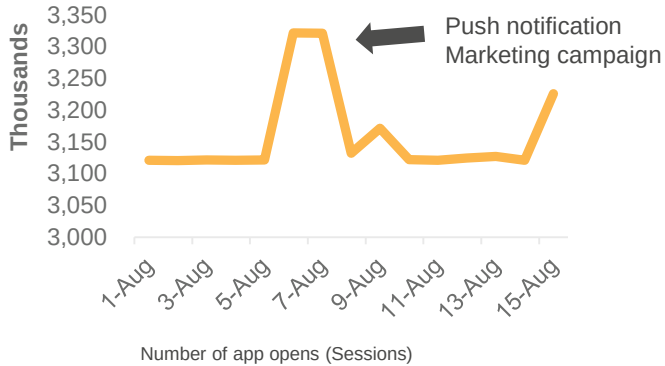
Number of app opens (Sessions)





Time spent in the app (total session length)

1 Engagement



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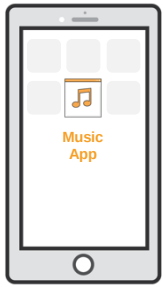
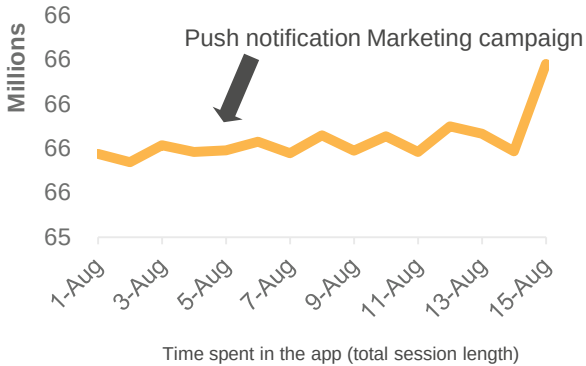
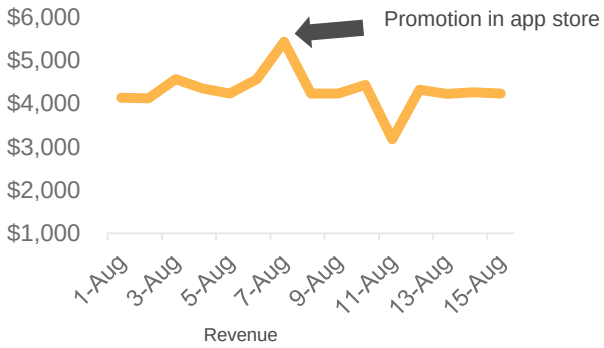


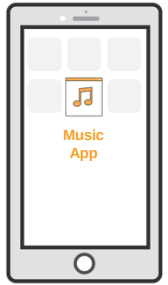


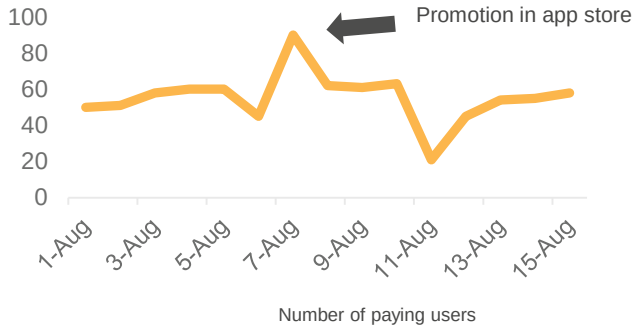
Time spent in the app (total session length)

Marketing campaign did successfully improve app opens but did not result in users spending more time in the app

2 Monetization







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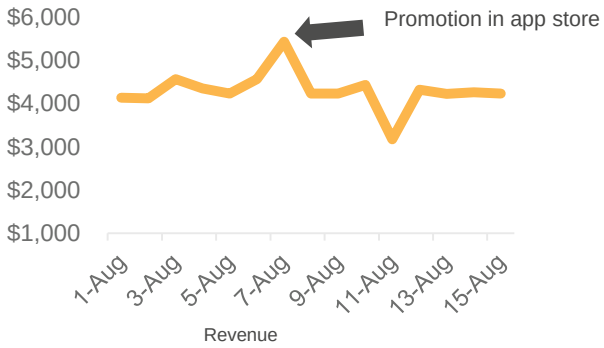
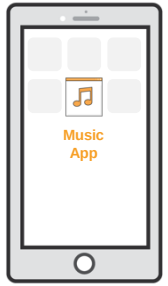
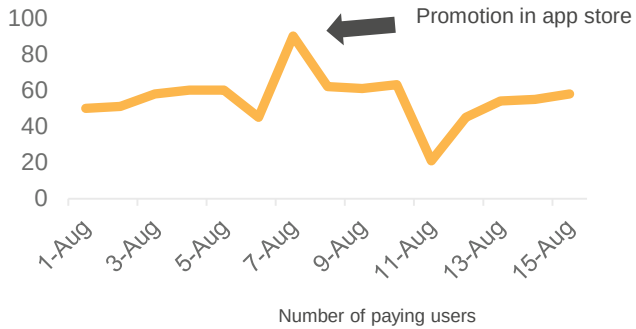
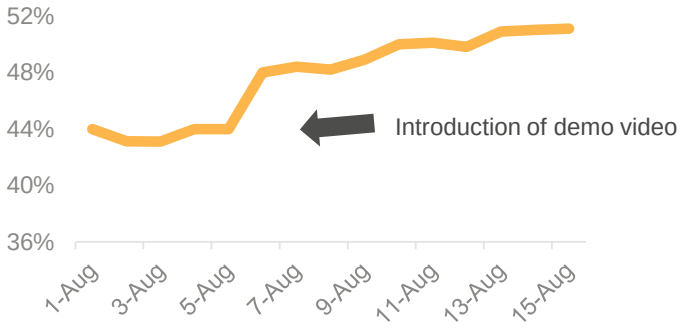




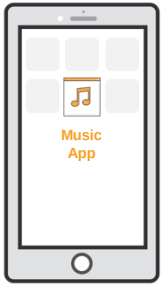


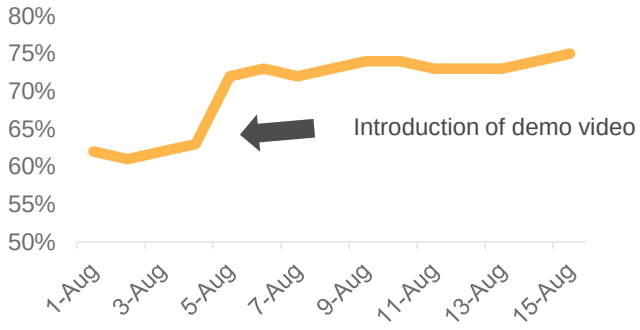
Promotion in the app store increased the over all revenue and more importantly the number of paying users as well

3 Retention



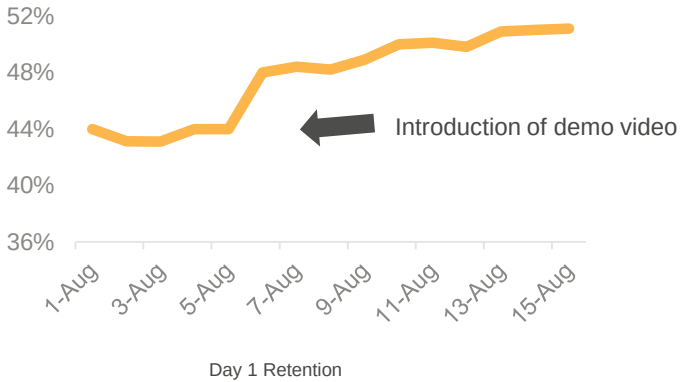
Day 1 Retention





Week 1 Retention

3 Retention



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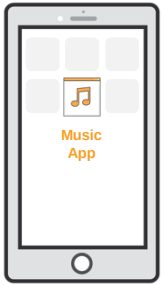
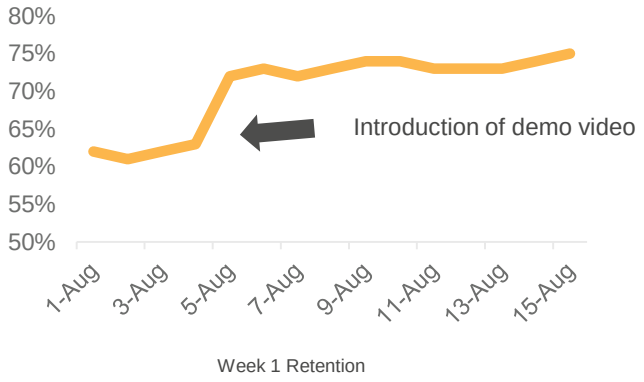
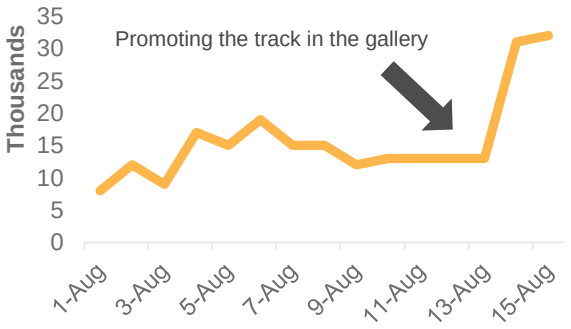




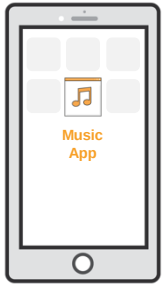
Week 1 Retention

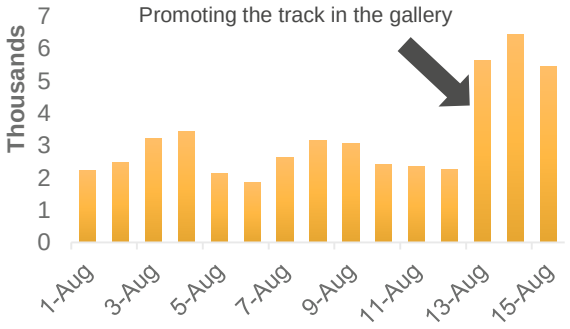
Changing the first time experience in the app has significantly improved retention in the app

4 Behavioral



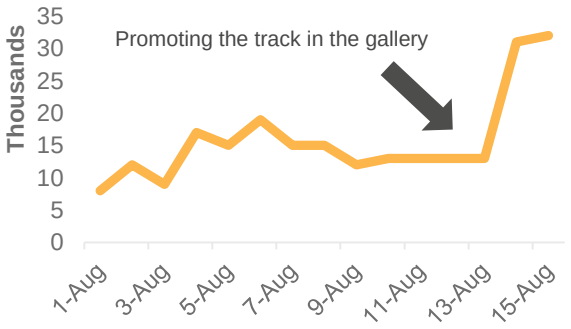
Number of purchases of a music track





Number of likes/shares for an Artist

4 Behavioral



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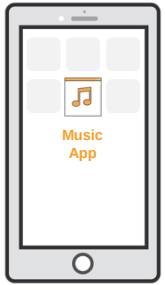
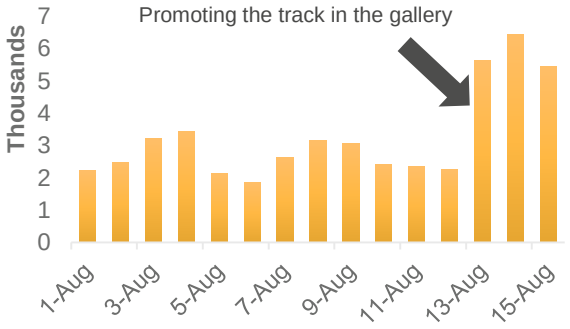




Number of likes/shares for an Artist

Promoting the track has not only increased purchases for the track but has also increased the number of shares for the artist

Is there a easy way to track all these metrics automatically as soon as users start to use your app ?

Amazon Mobile Analytics

"Collect, visualize and export your app usage data at scale"

1

Fast

Focus on metrics that matter. Usage reports available within 60 minutes of receiving data from an app

2

Scalable and Generous Free Tier

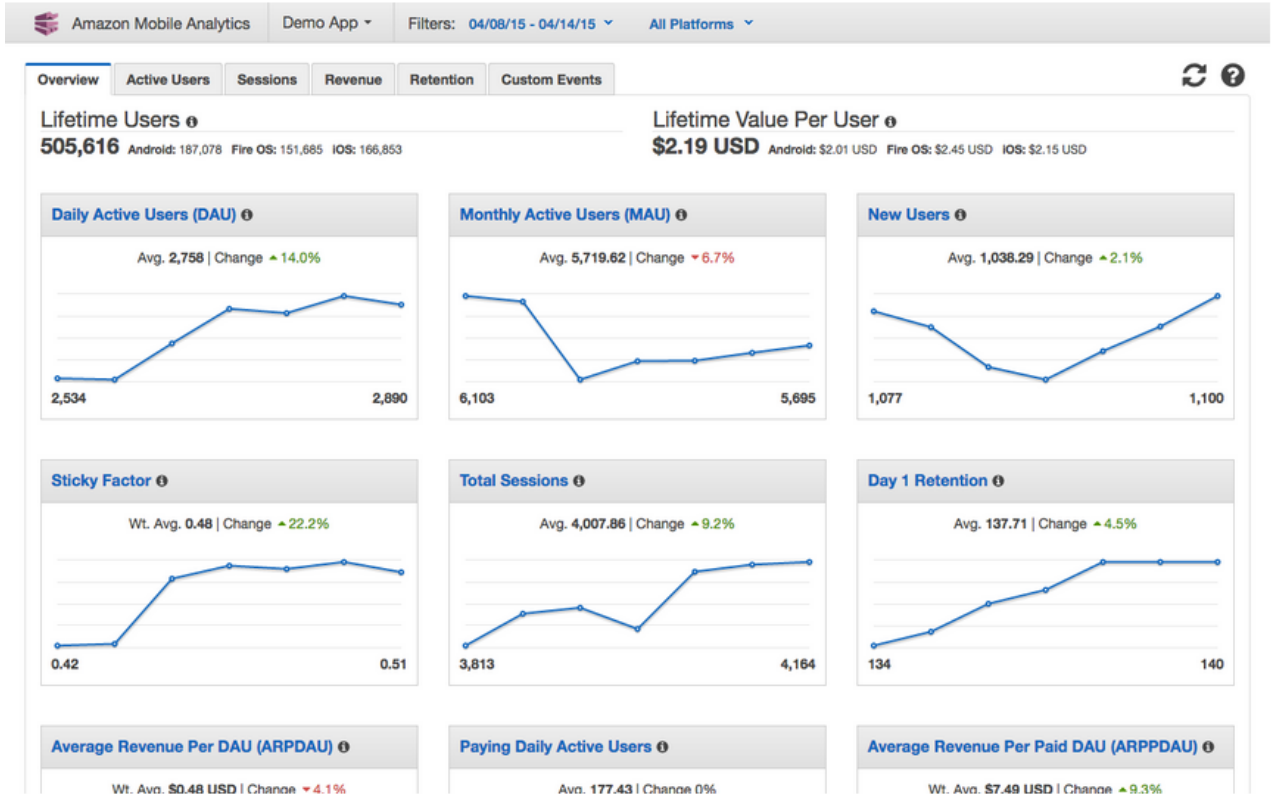
Scale to billions of events per day from millions of users.

3

Own Your Data

Data collected are not shared, aggregated, or reused

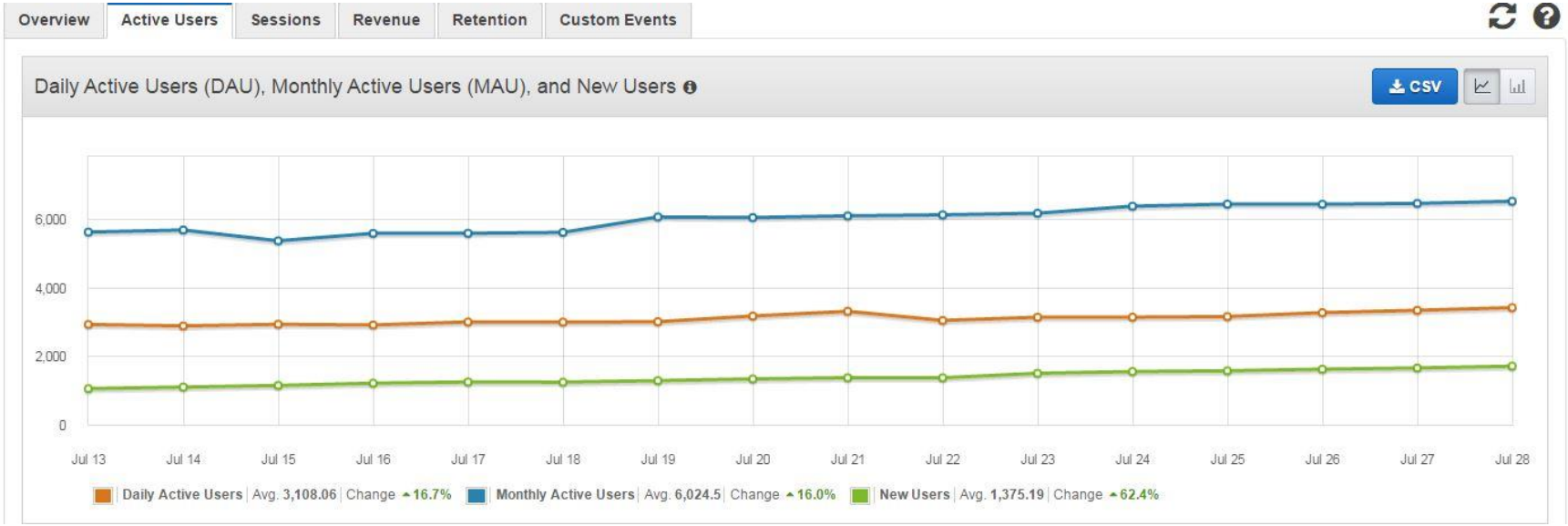
Get Metrics Important for Your App in a Single View



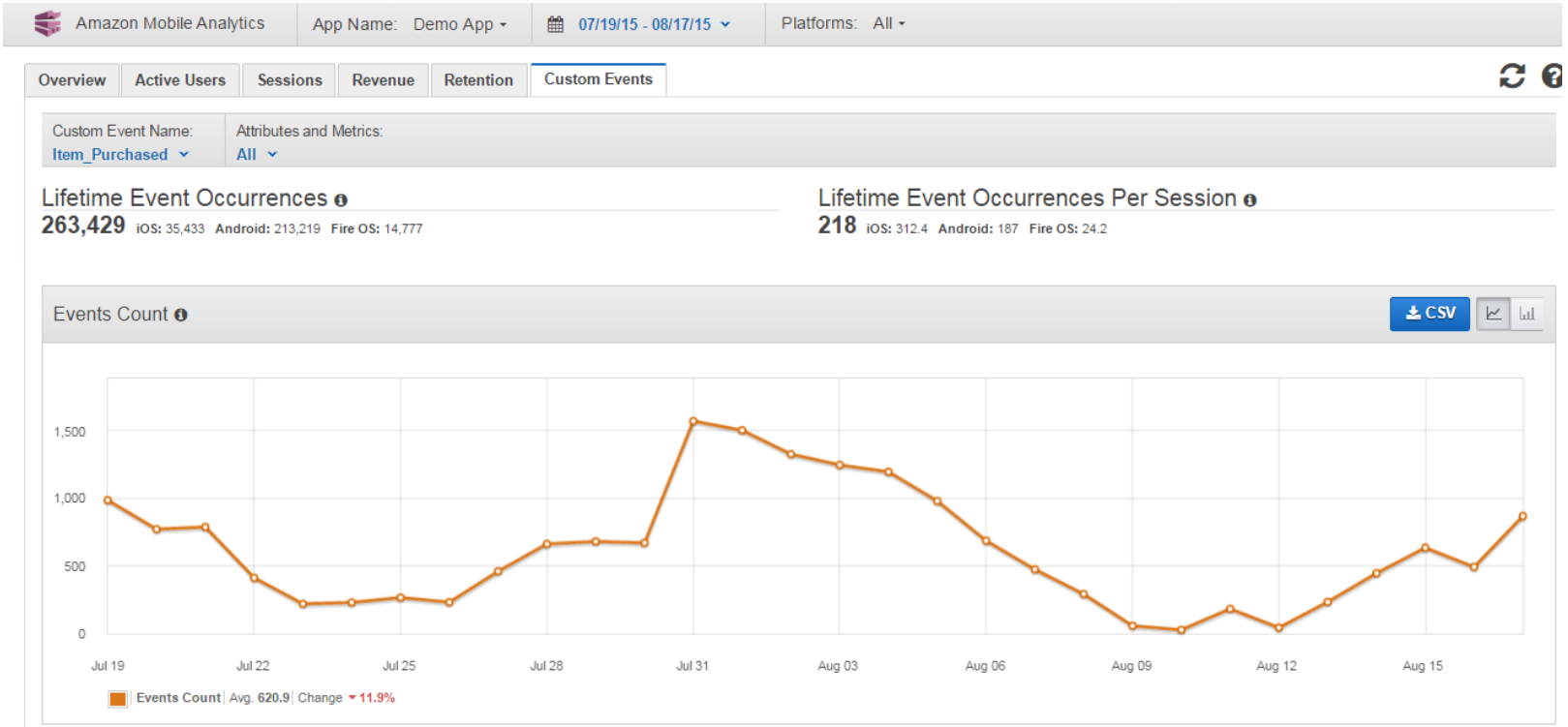
Key Business Metrics

1. Monthly Active Users (MAU)
2. Daily Active Users (DAU)
3. New Users,
4. Daily Sessions
5. Sticky Factor
6. 1-Day Retention
7. Avg. Revenue per DAU
8. Daily Paying Users
9. Avg. Paying DAU

Get a Detailed View of Each Business Metric



Track Unique Behavior to Your App Using Custom Events



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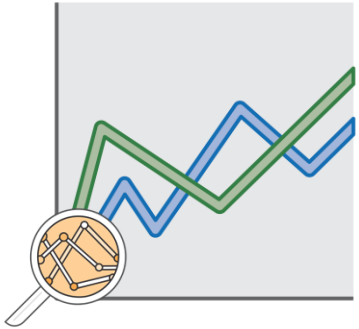

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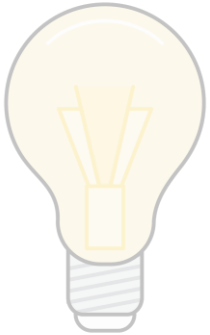

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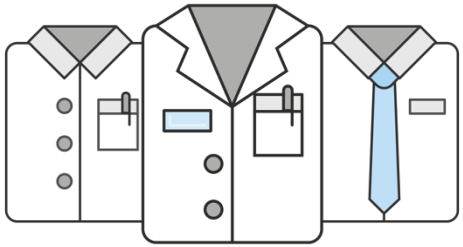
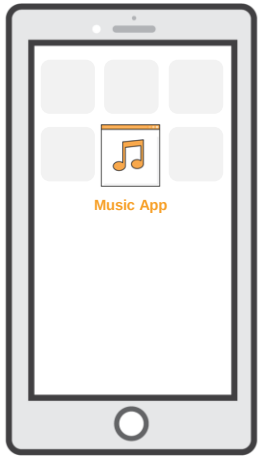


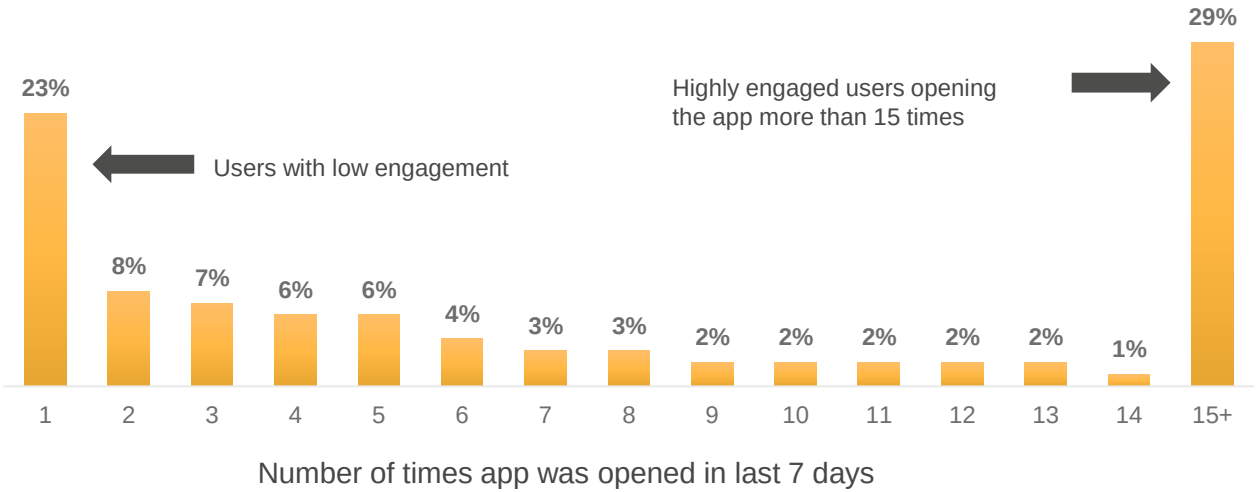
Going beyond standard metrics will give you more insight in to user behavior

Few Questions that Will Help you Understand your Users Better

1. Who are the most engaged users and what are their usage patterns ?
2. How does usage pattern vary for users with different demographic profiles?
3. How does user population distribute across countries and platform ?
4. How much time does it takes for a user to convert to a paying user ?



1 Who are the Most Engaged Users and What are their Usage Patterns?



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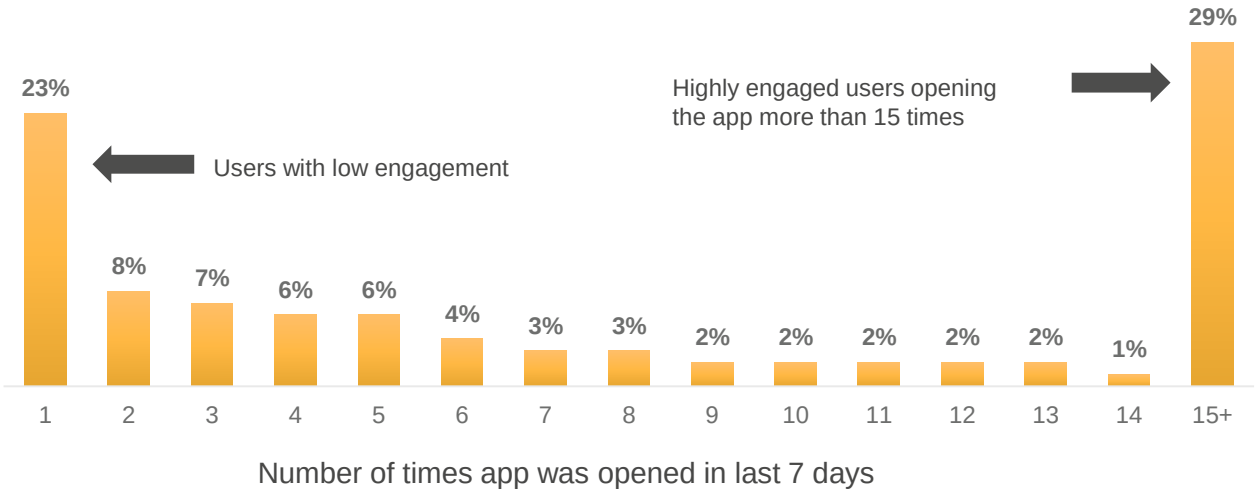
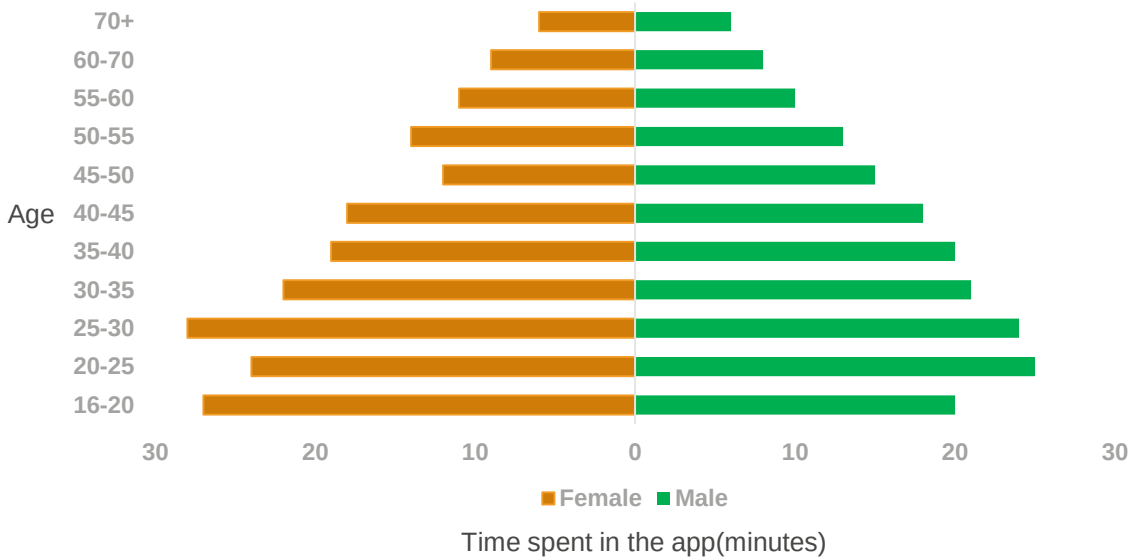


Design strategies to influence users with low engagement and convert them to highly engaged users

2 How Does Usage Pattern Vary for Users with Different Demographic Profiles?



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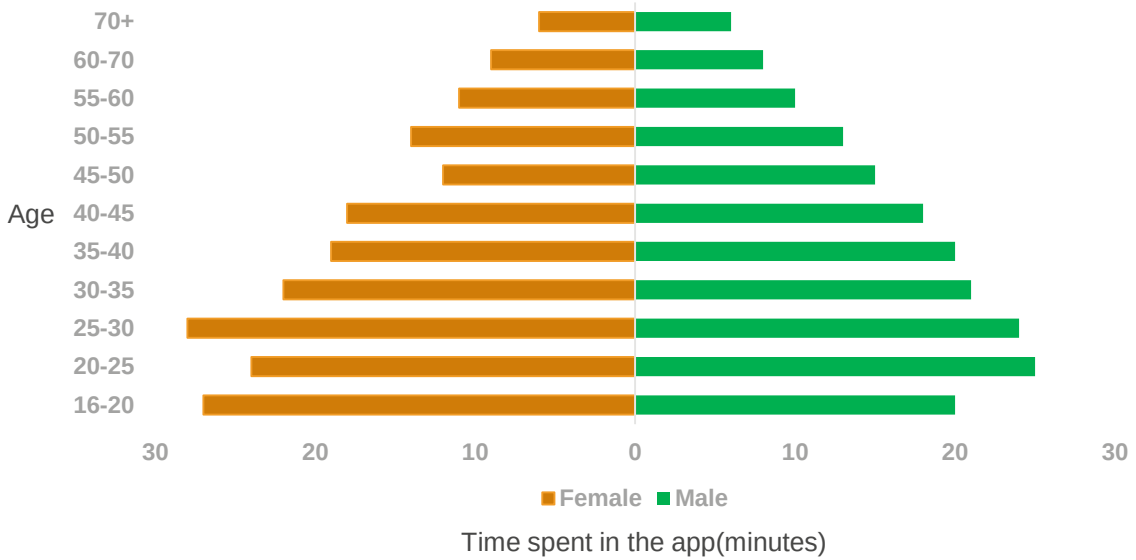
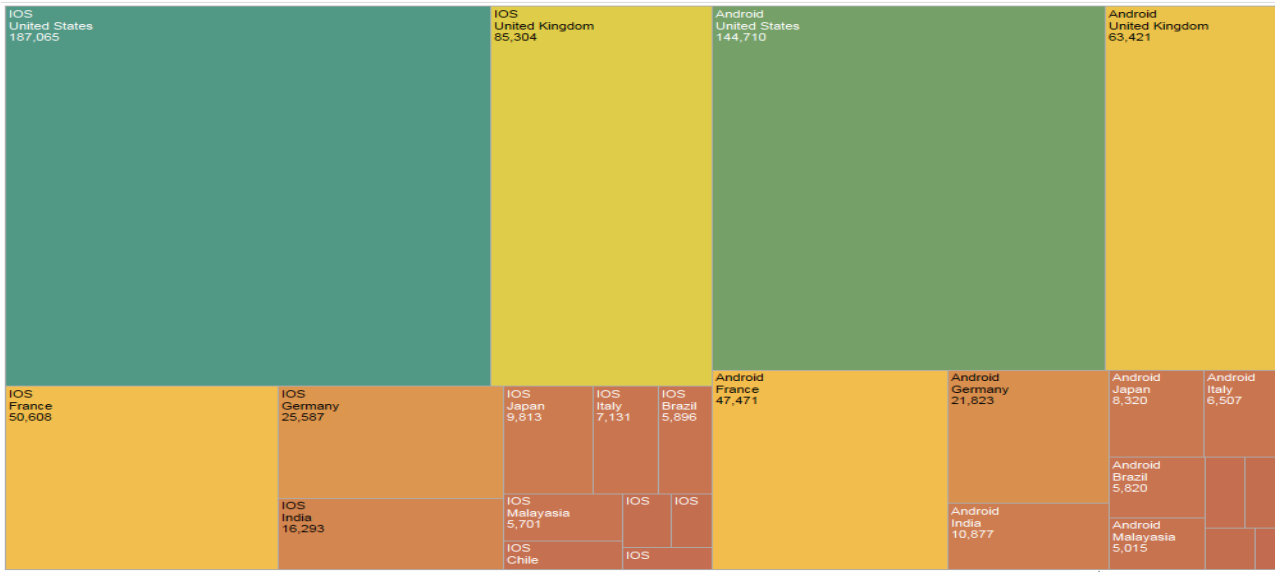


Understand your core user demographic profile and deliver relevant content to them

3 How Does User Population Distribute Across Countries and Platform?



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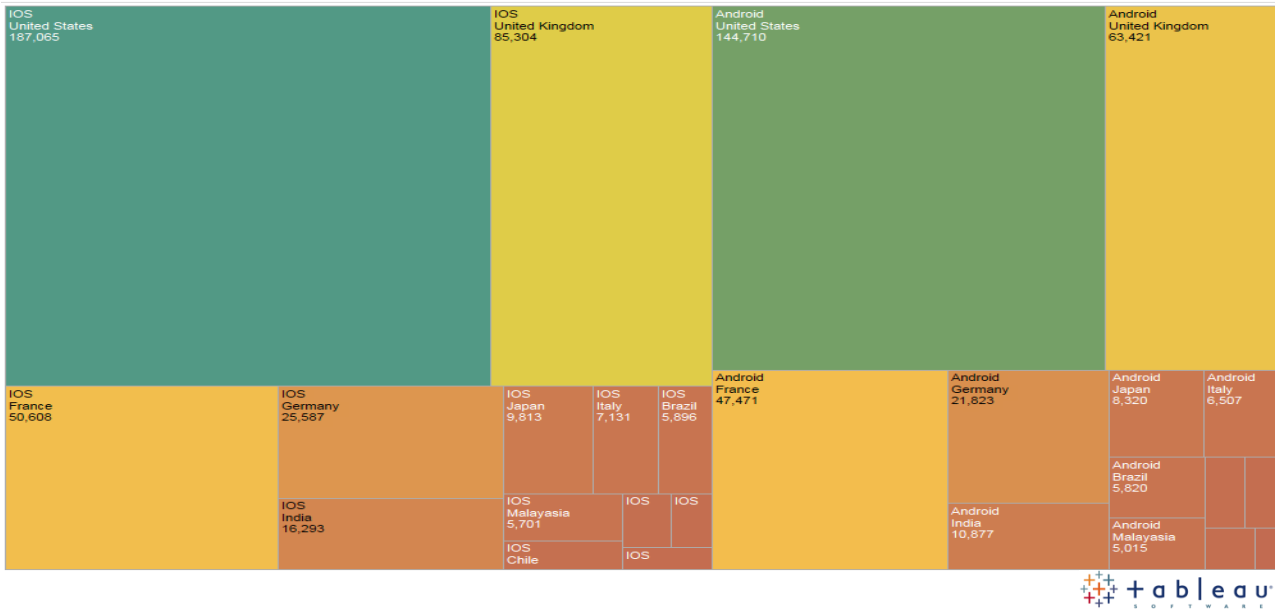
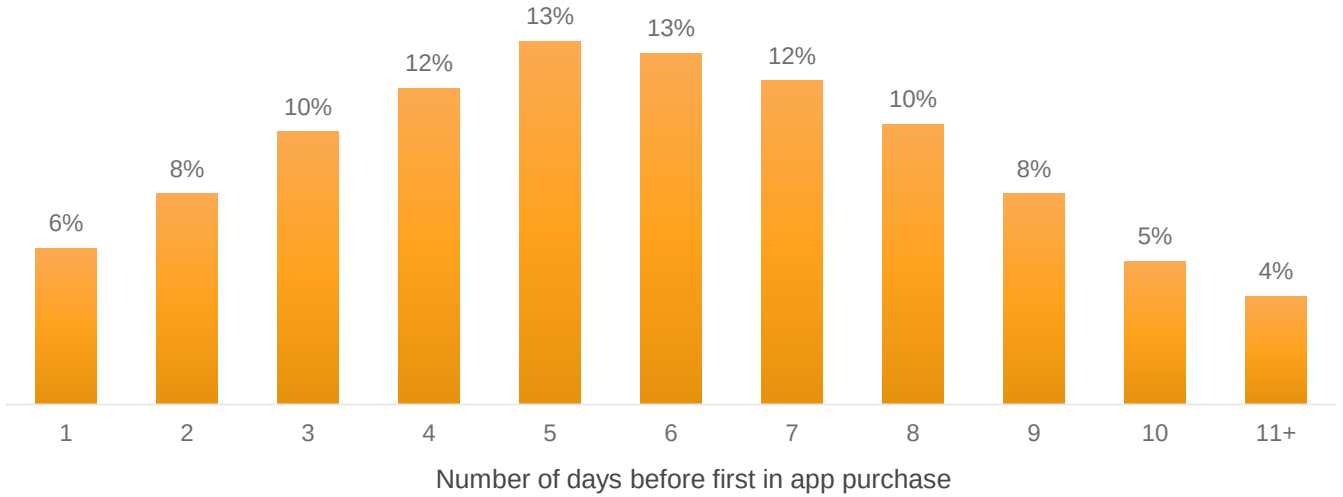


Formulate new user acquisition plans in countries that the app has low penetration

4 How Many Days Does it Take for a First Time User to Convert to a Paying User?



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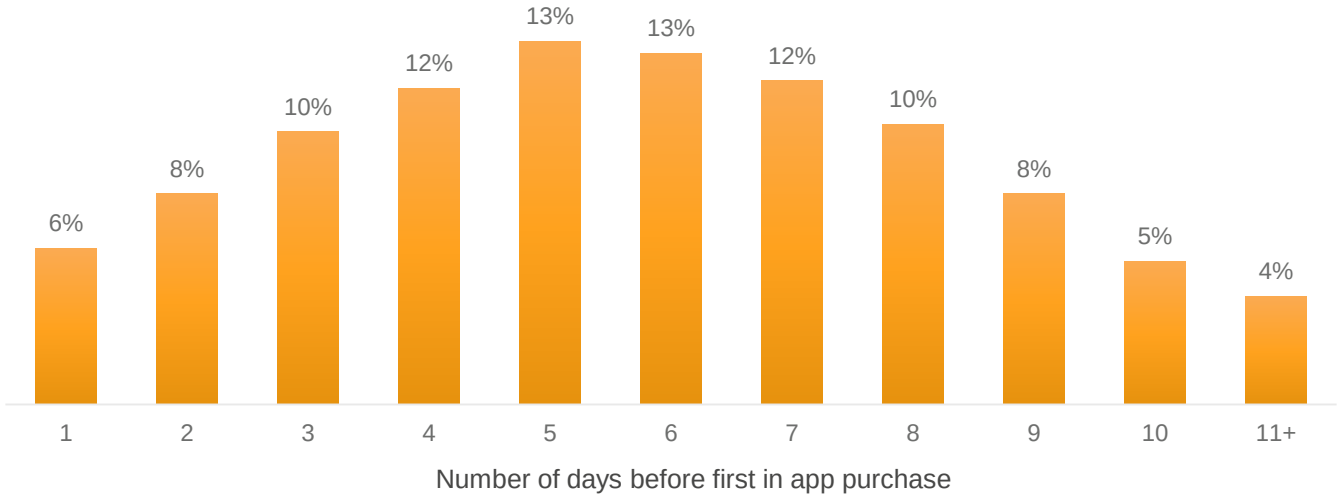
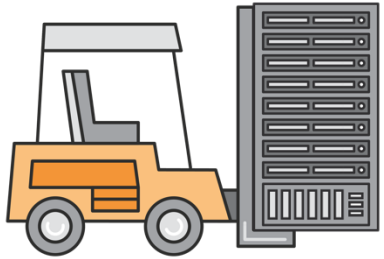


Target users who have spent more than 8 days in the app and are yet to purchase

Auto Export to Amazon Redshift

Amazon Mobile Analytics

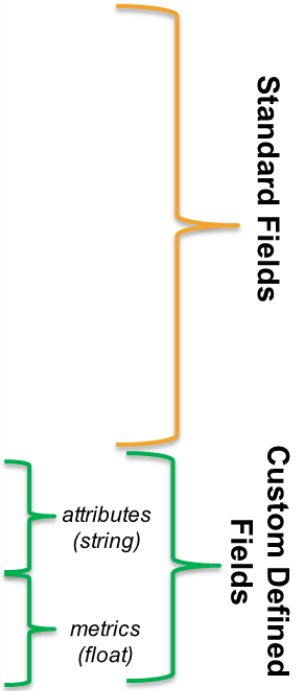


Amazon S3 & Amazon Redshift

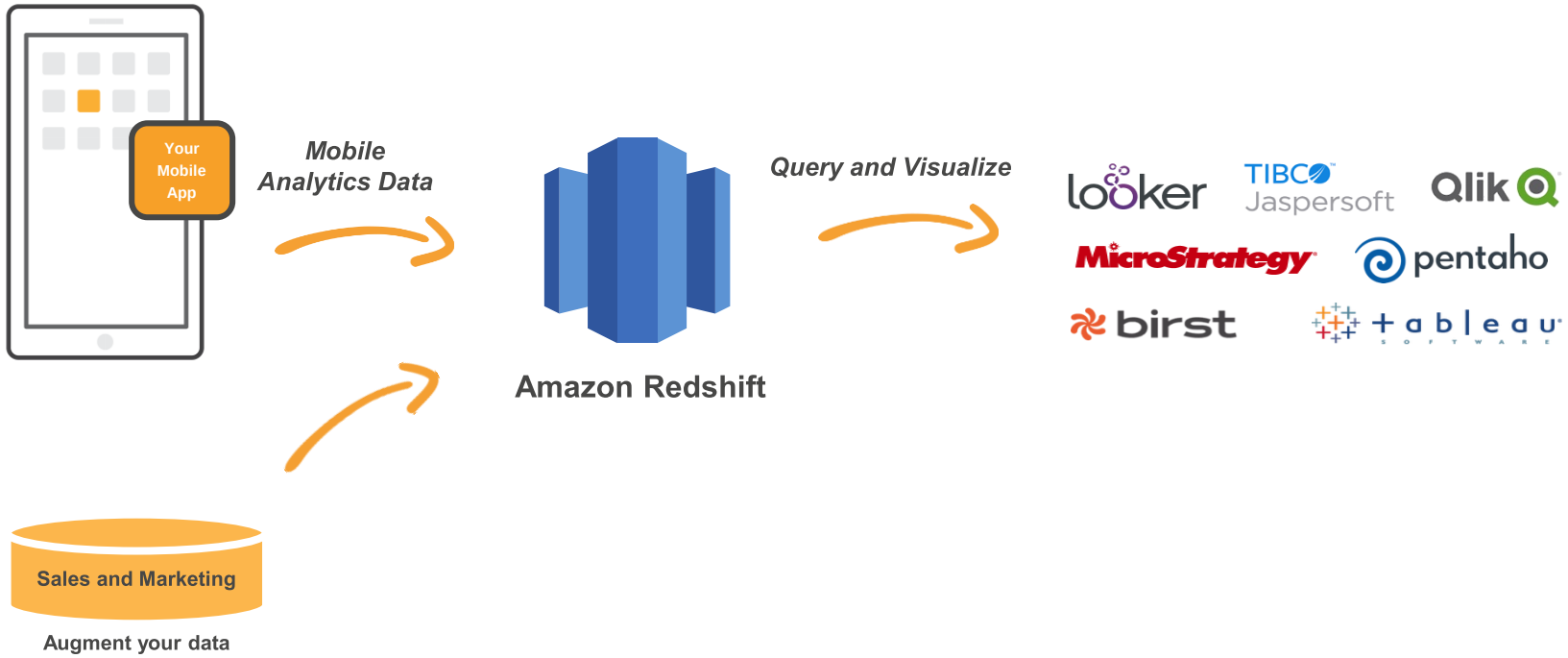
Schema for Your App's Event Data

1. Simple & intuitive
2. Automatically collect common attributes
3. Integrate with existing data models

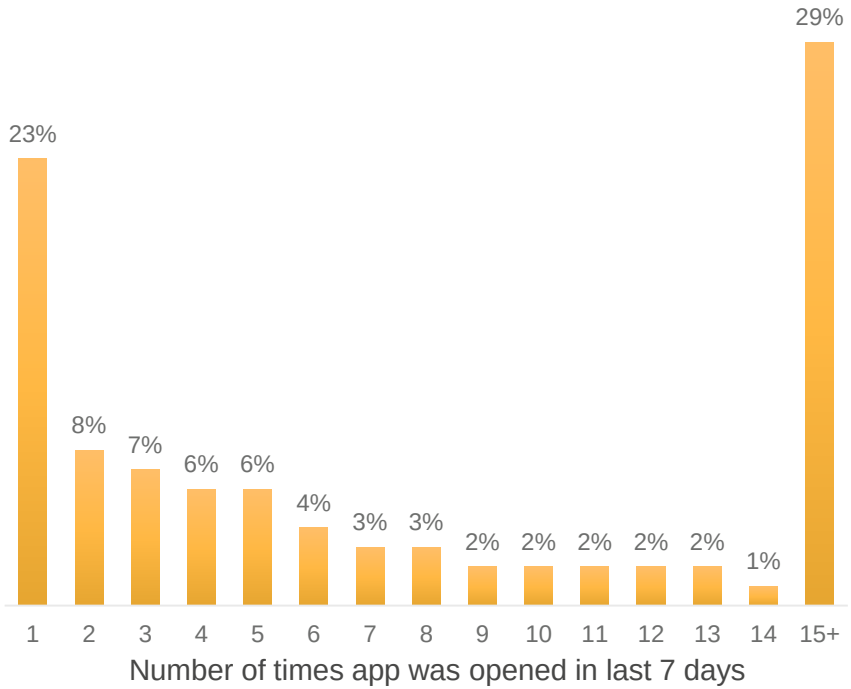
event_timestamp	arrival_timestamp
application_key	account_id
app_title	event_type
unique_id	model
make	platform
platform_version	locale
app_package_name	app_version_name
sdk_name	sdk_version
a_genre	
a_promo_code	
m_songtime_played	
m_rating	



Now Easy to Query and Visualize



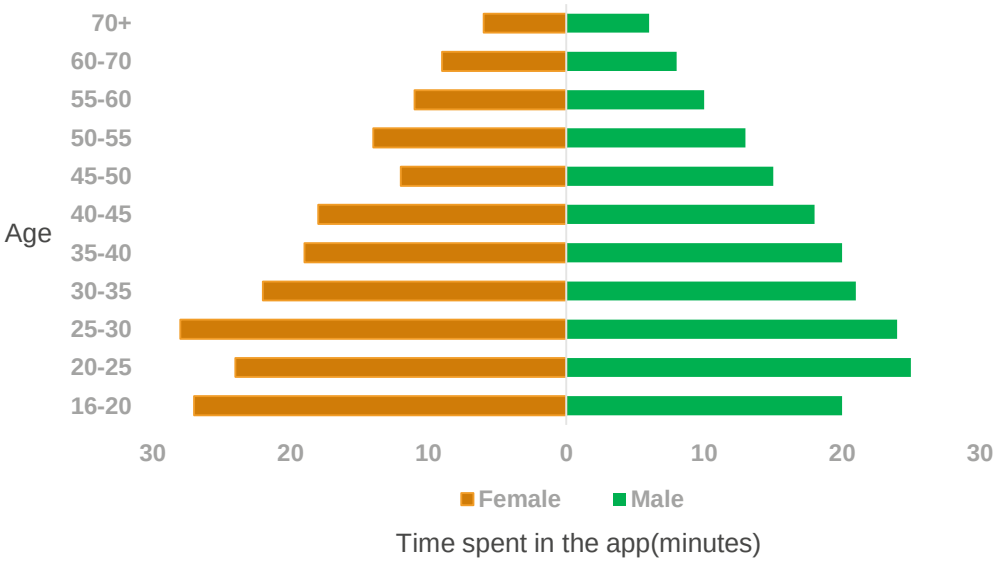
1 Who are the Most Engaged Users and What are their Usage Patterns?



SQL Query

```
select “app opens”,
       count(users) as “frequency”
 from (
select
        client_cognito_id as “users”
       ,count(*) as “app opens”
From
     AWSMA.v_event
Where
     event_type=‘_session.start’
And  event_typestamp between
     getdate()-7 and getdate()+1
Group by client_cognito_id
)
Group by “app opens”
```

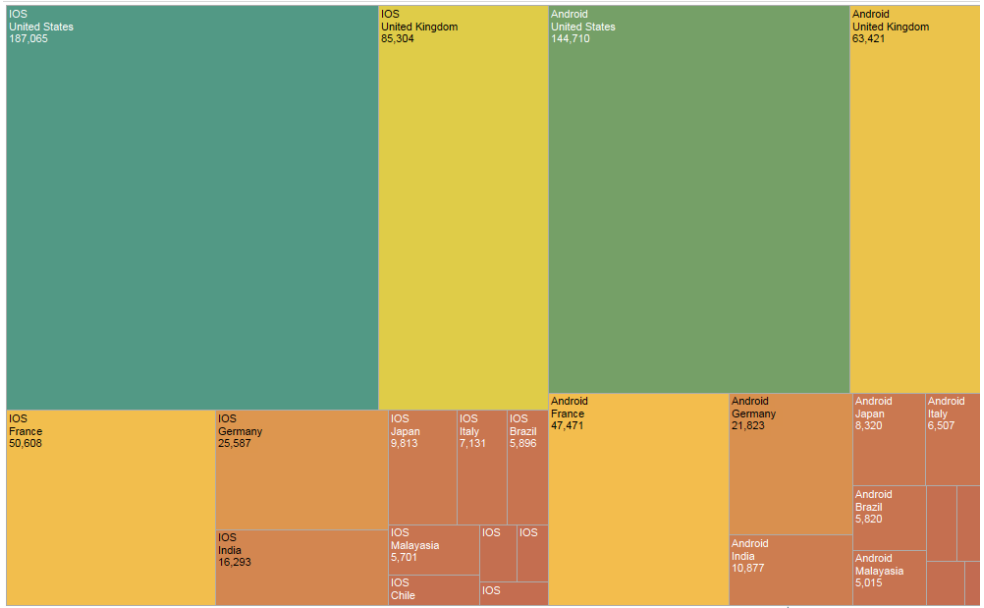
2 How Does Usage Pattern Vary for Users with Different Demographic Profiles?

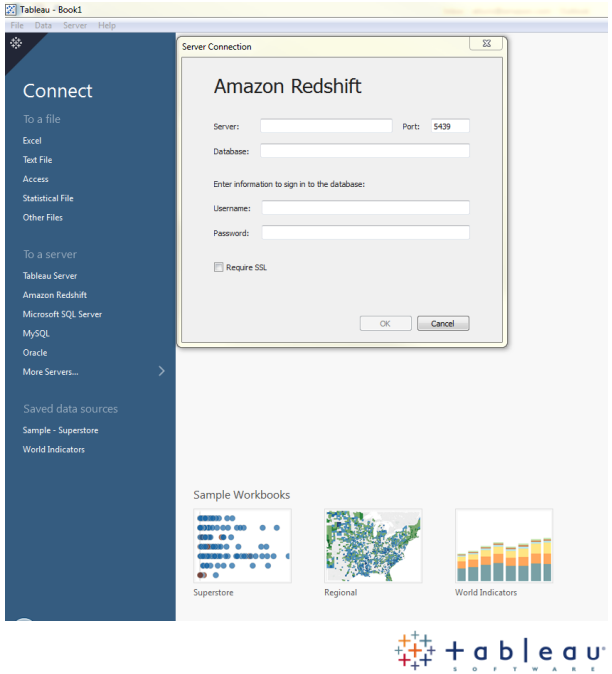


SQL Query

```
select
      a_age as “age”
     ,a_gender as “gender”
     ,avg(m_session_length) as “time spent”
From
      AWSMA.v_event
Where
      event_type=‘a_session.duration’
And   event_typestamp between
      getdate()-90 and getdate()+1
Group by
      m_age
      ,m_gender
```

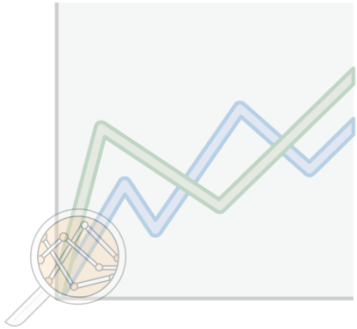
3 How Does User Population Distribute Across Countries and Platform?



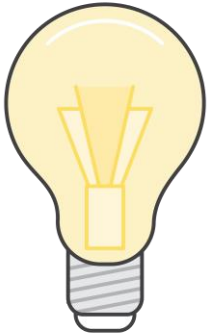


Three Types of Data Driven Development

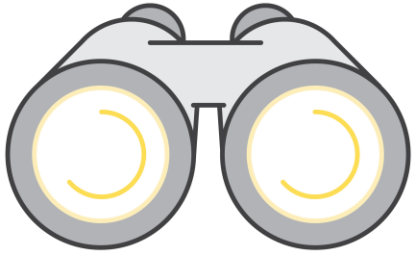
Retrospective
reporting to analyze trends and to know what's happening in the business



Inquisitive
pattern finding to discover latent user behavior and to frame strategies accordingly

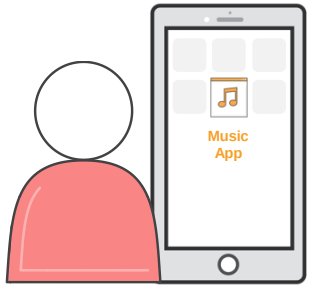


Predictive
applications to anticipate user behavior and to enhance experience



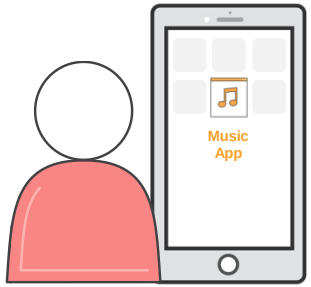
Predicting user behavior will help you deliver personalized experience for users

Predictive Application by Example



Susan has been using the app for more than 6 months now but she hasn’t opened the music app in the last ten days

Predictive Application by Example



Susan has been using the app for more than 6 months now but she hasn’t opened the music app in the last ten days

What would you do to bring her back to the app again ?

Predictive Application by Example

Push Notification

“Susan, you haven’t listened to your favorite artists in a while. Want to check them out? ”

Predictive Application by Example

Push Notification

“Susan, you haven’t listened to your favorite artists in a while. Want to check them out? ”

But what’s the best time to send her this push notification ?

One Way To Do is…

```
SELECT e.time_stamp

FROM     events e

WHERE  customer ='SUSAN'

AND       event_type = '_push_notification_open'

HAVING e.date> GETDATE() - 30
```

You can start by looking at all the different time slots she has opened a push notification in the last 30 days

One Way To Do is…

```
SELECT e.time_stamp
FROM     events e
WHERE  customer ='SUSAN'
AND       event_type = '_push_notification_open'
AND       date_part (dow,e.date ) in (6,7)
HAVING e.date> GETDATE() - 30
```

But her usage pattern changes on weekends.

You can edit the query to filter for weekends only

One Way To Do is…

```
SELECT e.time_stamp
FROM     events e
WHERE  customer ='SUSAN'
AND       event_type = '_push_notification_open'
AND       date_part (dow,e.date ) in (6,7)
HAVING e.date> GETDATE() - 60
```

Pattern is not clear as she opened in multiple time slots on different days.

You can go back in time to get a more clear pattern

One Way To Do is…

```
SELECT e.time_stamp
FROM     events e
WHERE  customer  in ('SUSAN','JOE','BOB',.....)
AND       event_type = '_push_notification_open'
AND       date_part (dow,e.date ) in (6,7)
HAVING e.date> GETDATE() - 60
```

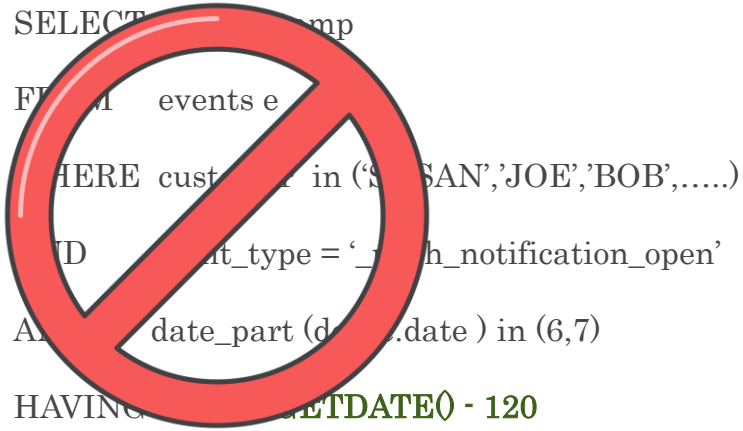
but what about other users ?

tweak the query again

One Way To Do is…

```
SELECT e.time_stamp
FROM     events e
WHERE  customer  in ('SUSAN','JOE','BOB',.....)
AND       event_type = '_push_notification_open'
AND       date_part (dow,e.date ) in (6,7)
HAVING e.date> GETDATE() - 120
```

….and again



Use machine learning technology to **learn** business rules from your data

Better Way To Do it is…

Best time to Send

4 PM

9 AM

2 PM

Machine learning automatically finds patterns in your data and uses them to make predictions

Better Way To Do it is…

Best time to Send

4 PM

9 AM

2 PM

Machine learning automatically finds patterns in your data and uses them to make predictions

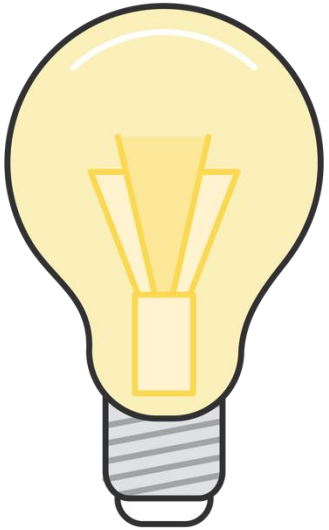
Your data + machine learning = personalization in the app

Why Aren’t there More Machine Learning Applications Today?

1. Machine learning expertise is **rare**
2. Building and scaling machine learning technology is **hard**
3. Closing the gap between models and applications is **time-consuming and expensive**

What if there were a better way?

Amazon Machine Learning



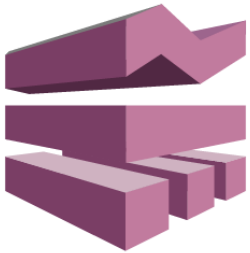
Easy to use, managed machine learning service built for developers

Robust, powerful machine learning technology based on Amazon’s internal systems

Create models using your data already stored in the AWS cloud

Deploy models to production in seconds

Leverage Mobile App Data in Amazon Redshift to Build Predictive Applications Using Amazon ML



Amazon Mobile Analytics

+

Amazon Redshift

Amazon Machine Learning

Building Predictive Applications with Amazon ML

1

Train model

2

Evaluate and optimize

3

Retrieve predictions

Building Predictive Applications with Amazon ML

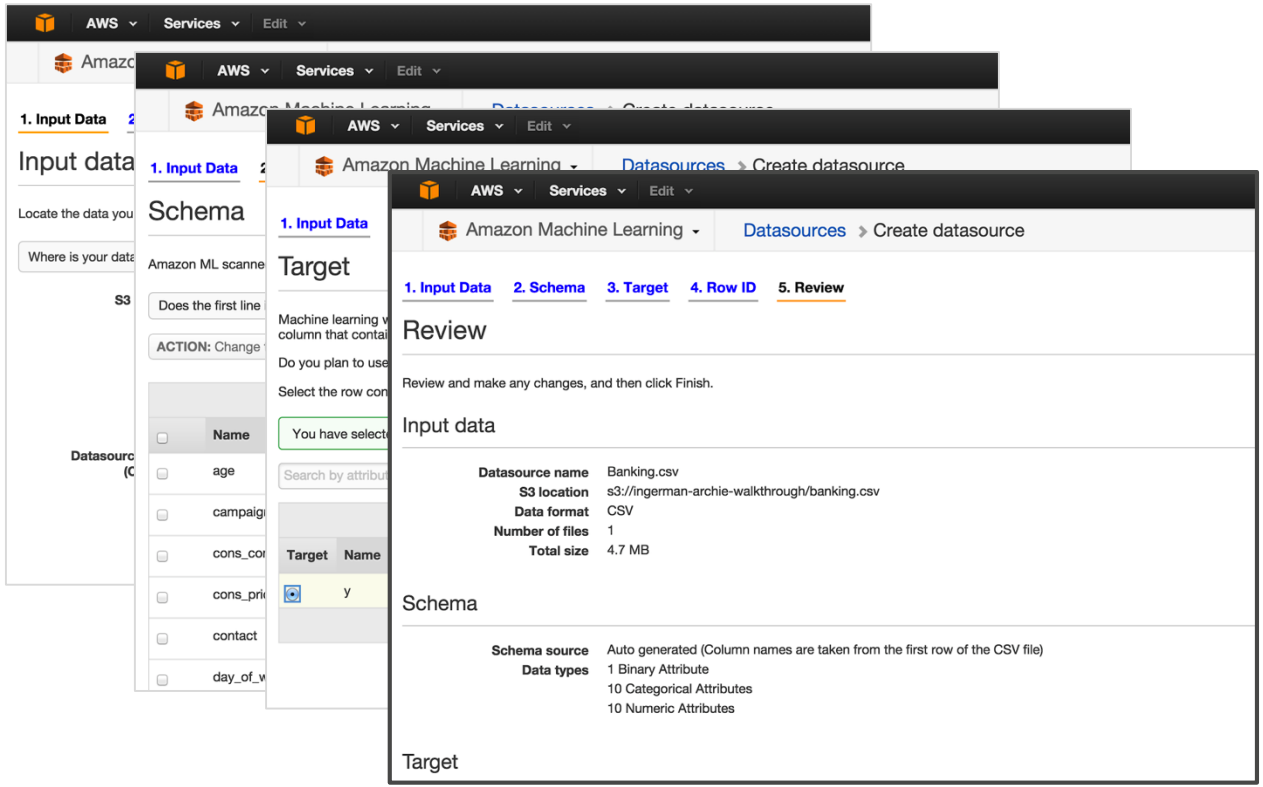
1 Train model

2 Evaluate and optimize

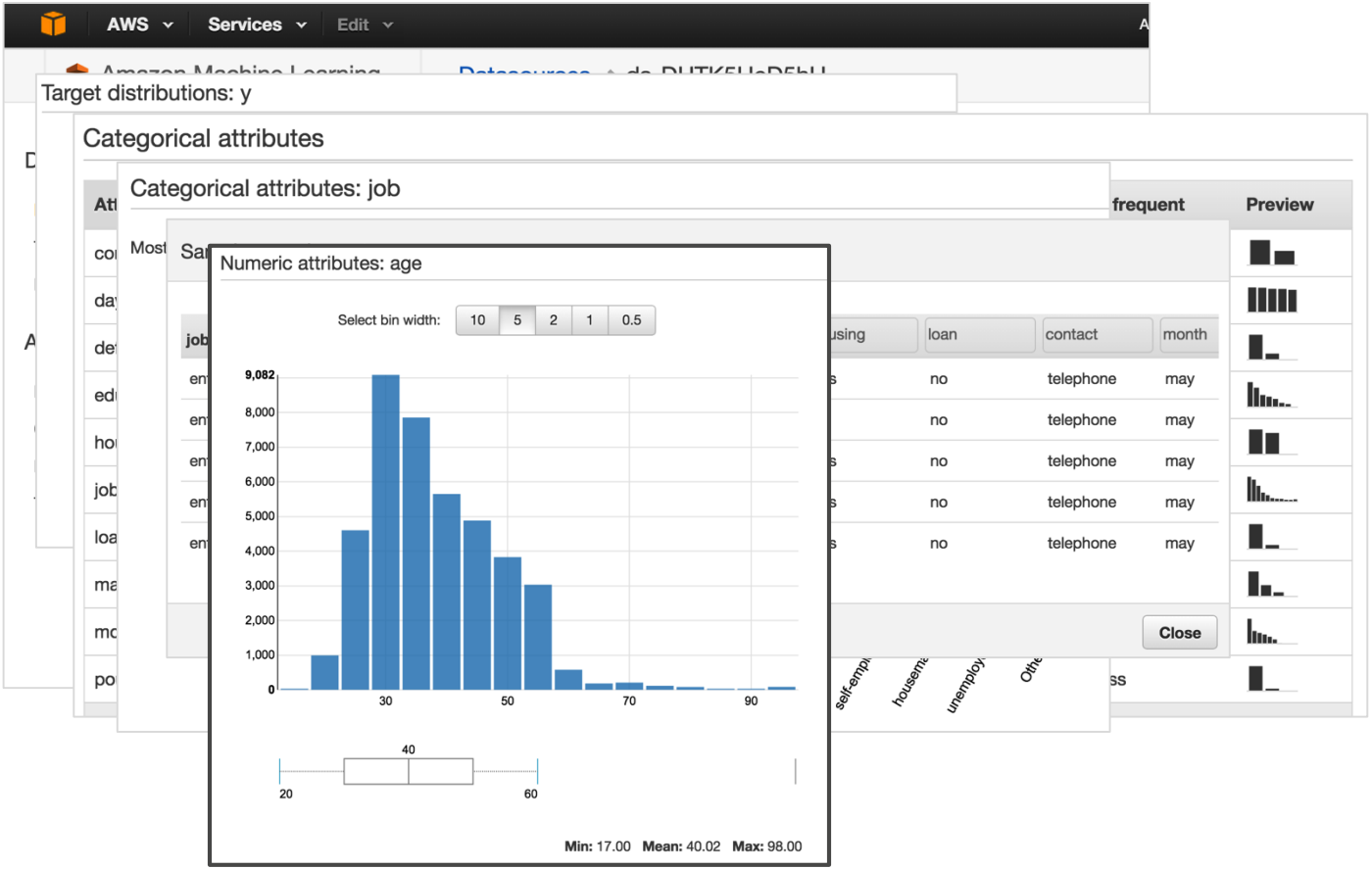
3 Retrieve predictions

- Create a Datasource object pointing to your mobile app data
- Explore and understand your data
- Transform data and train your model

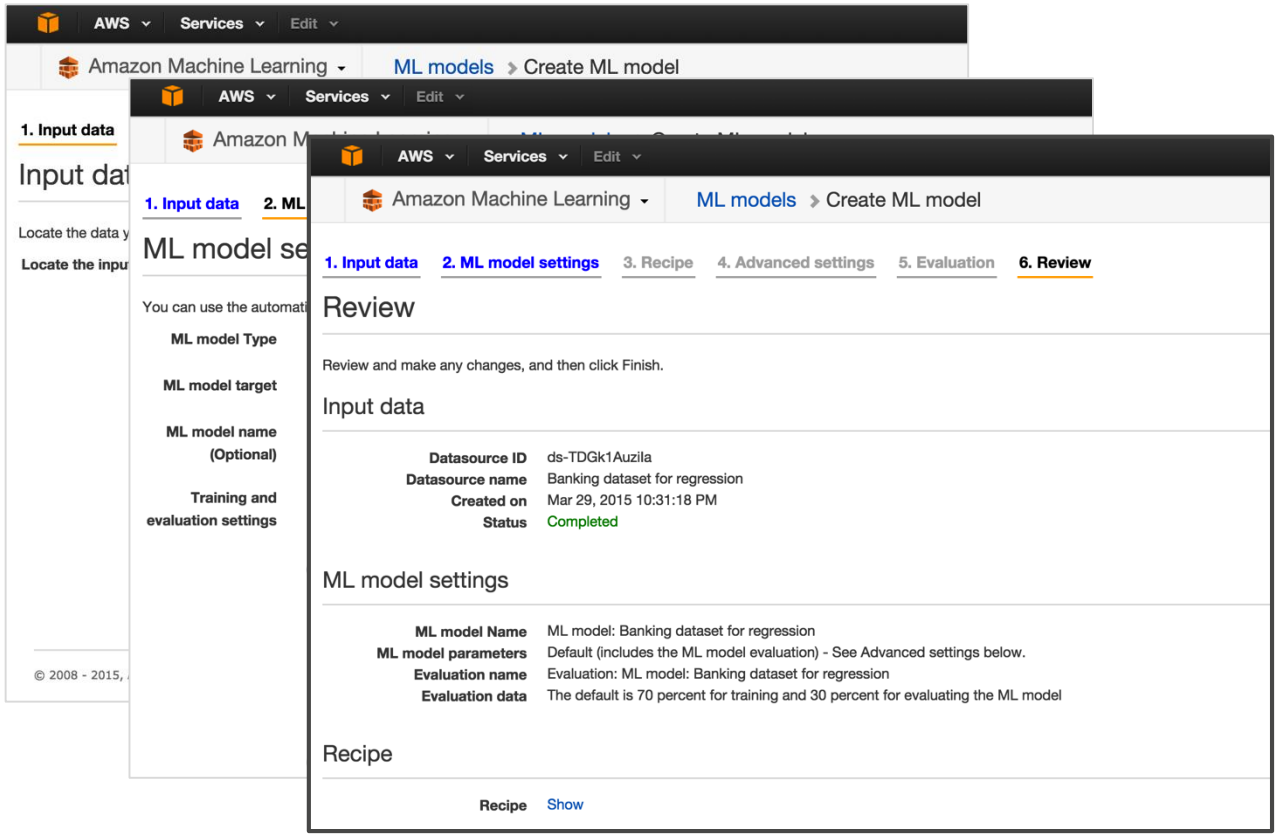
Create a Datasource Object



Explore and Understand Your Data



Train Your Model



Building Predictive Applications with Amazon ML

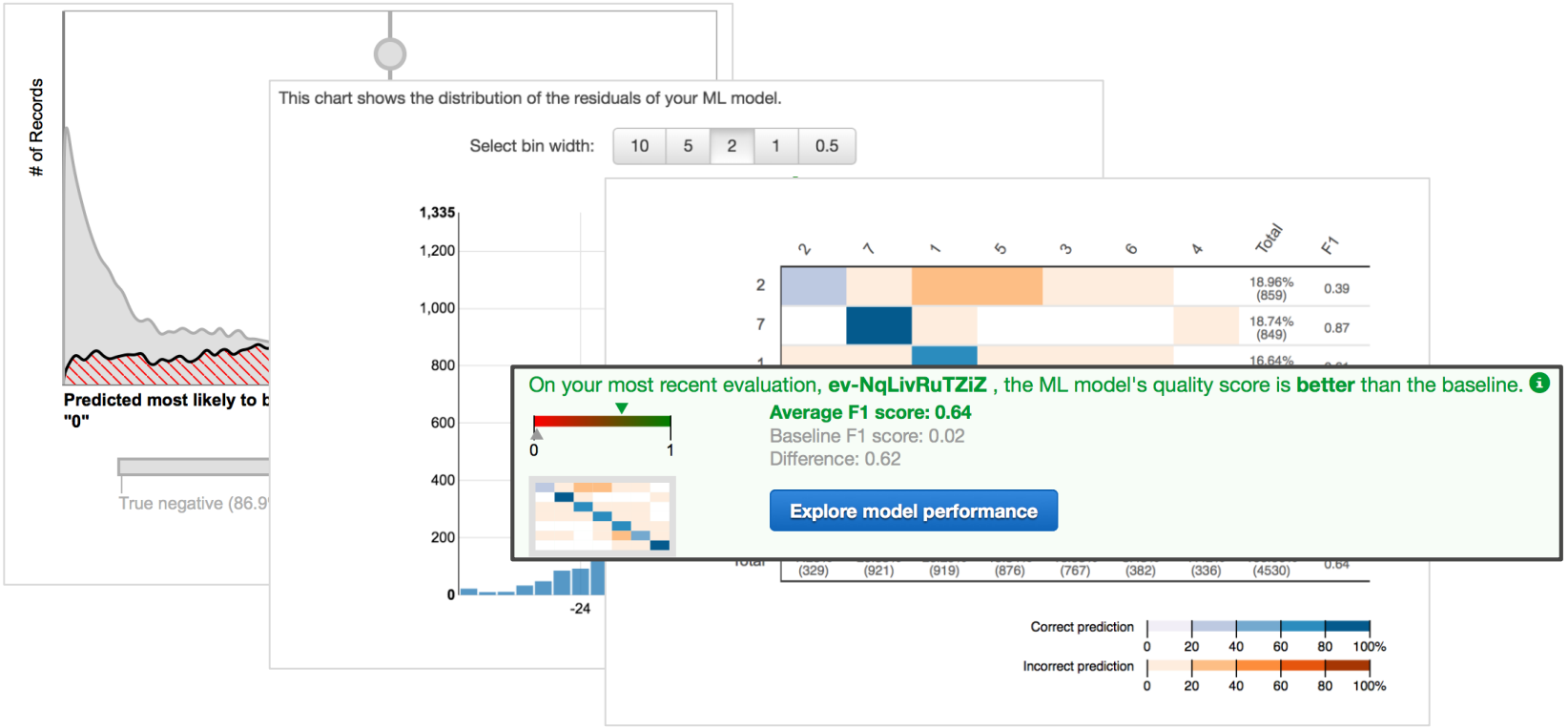
1 Train model

2 Evaluate and optimize

3 Retrieve predictions

- Understand model quality
- Adjust model interpretation

Explore Model Quality



Building Predictive Applications with Amazon ML

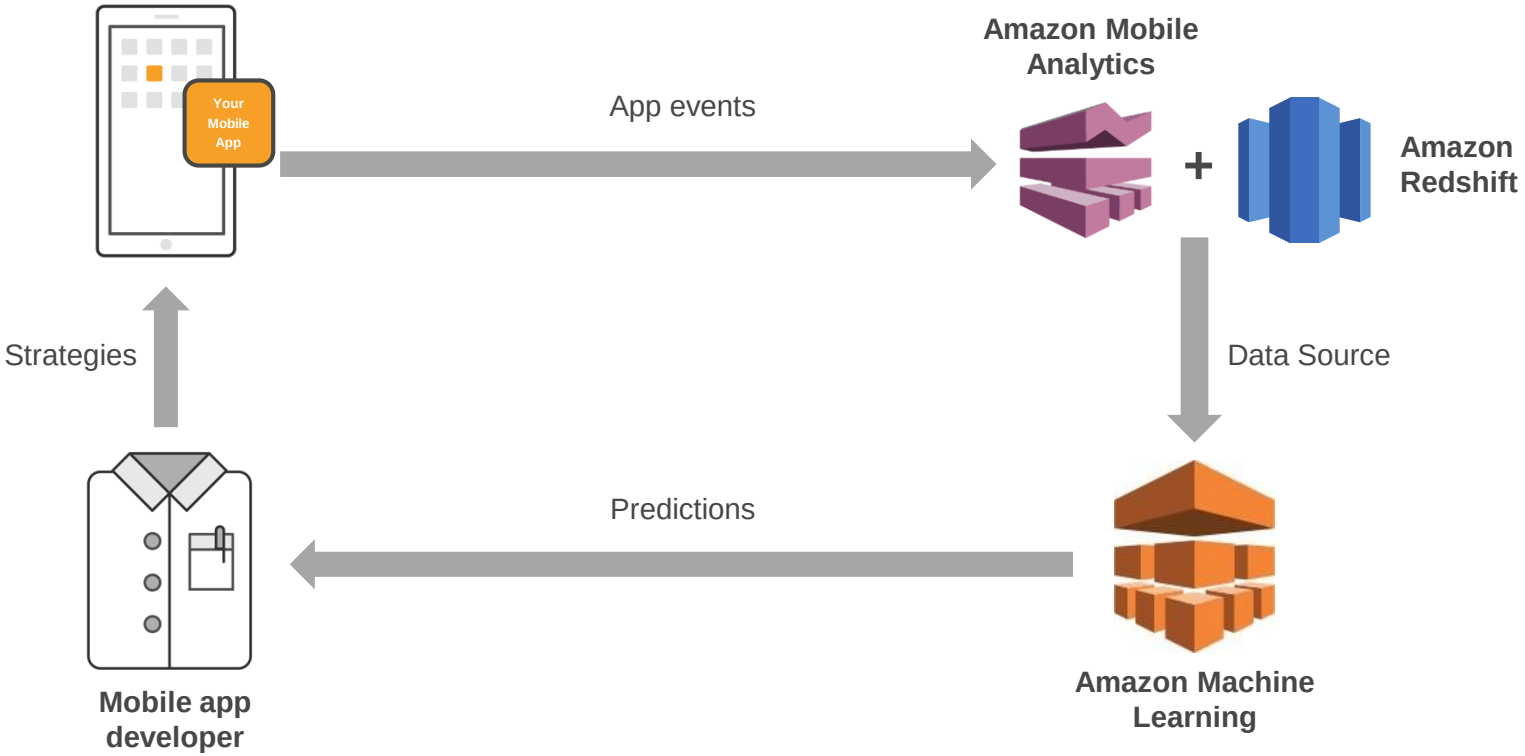
1 Train model

2 Evaluate and optimize

3 Retrieve predictions

- Batch predictions
- Real-time predictions

Now Build Predictive Applications Using Your Mobile App Data Easily



Few Strategies that can be Used Effectively via Machine Learning

1. Predict users with high probability to churn from the app and send push them notification to re-engage
2. Predict users with low probability to purchase in the app and send discount coupon via in-app notification
3. Identify users with high probability to share the app and reach out to them to do the same
4. Recommend relevant content to users based on similar user’s behavioral patterns

Thank you !

For further questions please email us at
amazon-mobile-analytics@amazon.com