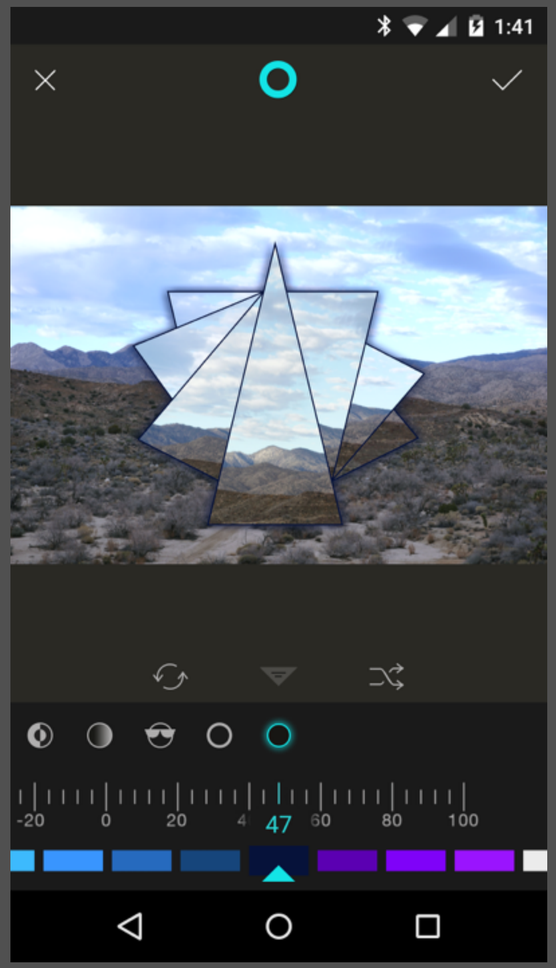
Reusable Libraries

Ryan Harter
@rharter
+RyanHarter

My Apps



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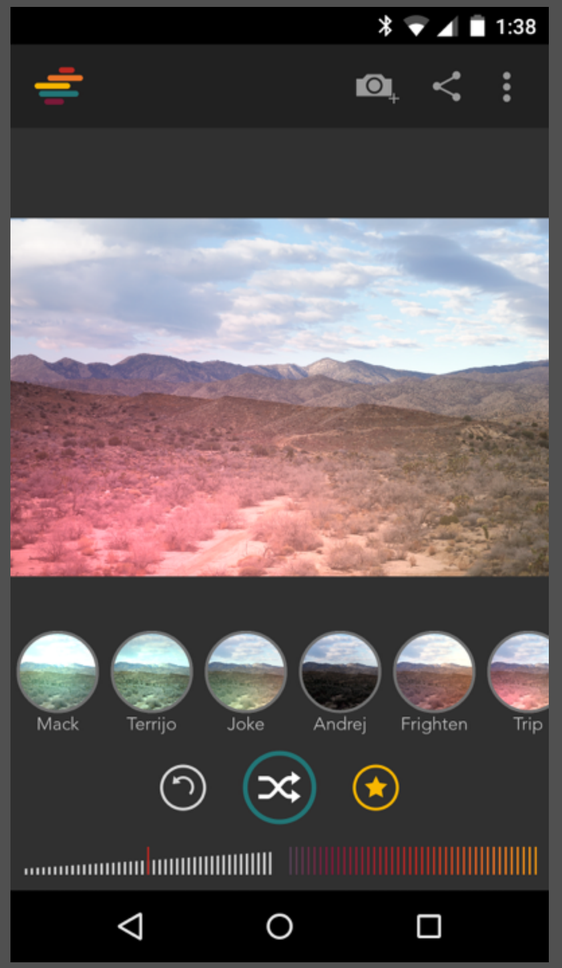


Shift

Harter's Tips for (Code) Happiness

- Identify good candidates
- Limit scope and requirements
- Design a good API
- Document and Communicate
- Treat it like a client project

Identify Good Candidates

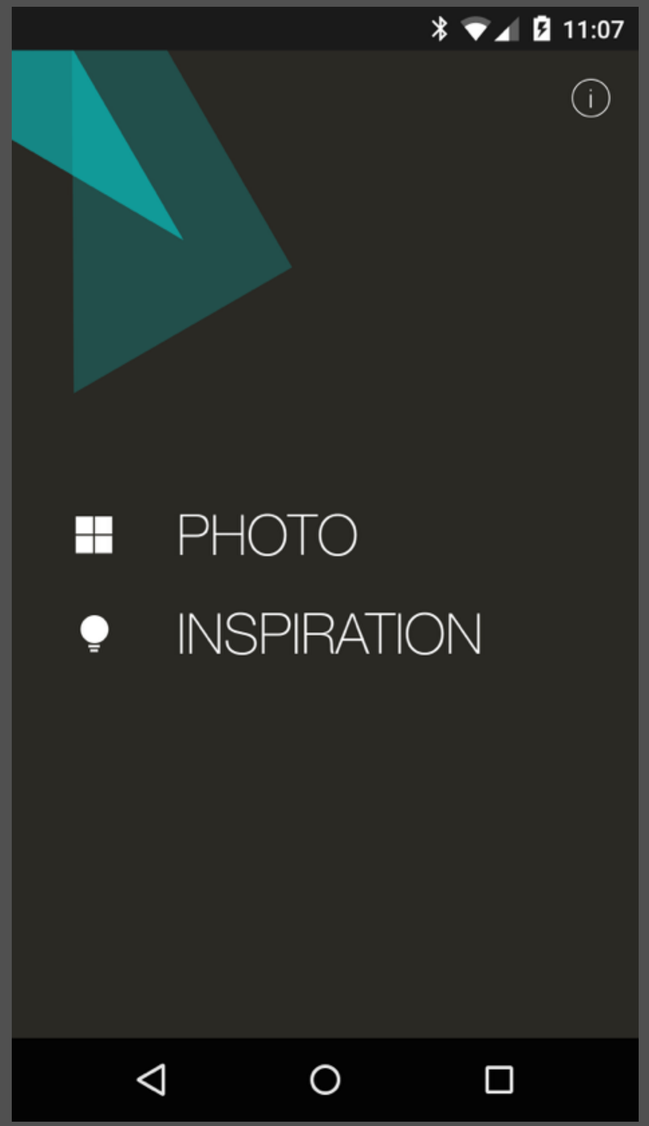
Identify Good Candidates

- It’s not a library if it’s only used once
- Don’t reinvent the wheel
- Focus on core of app

Identify Good Candidates

- Google for libraries
- Check Android Arsenal
- Look at what other apps use
- Be Confident
  - Count Stars
  - Inspect Source

Fragment



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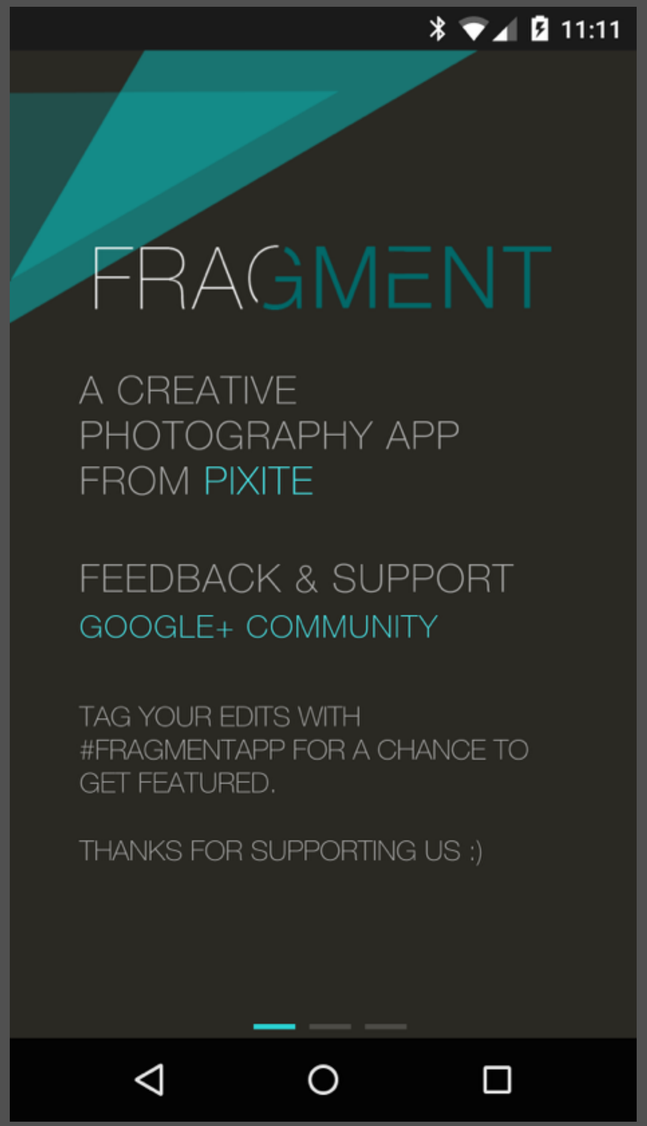
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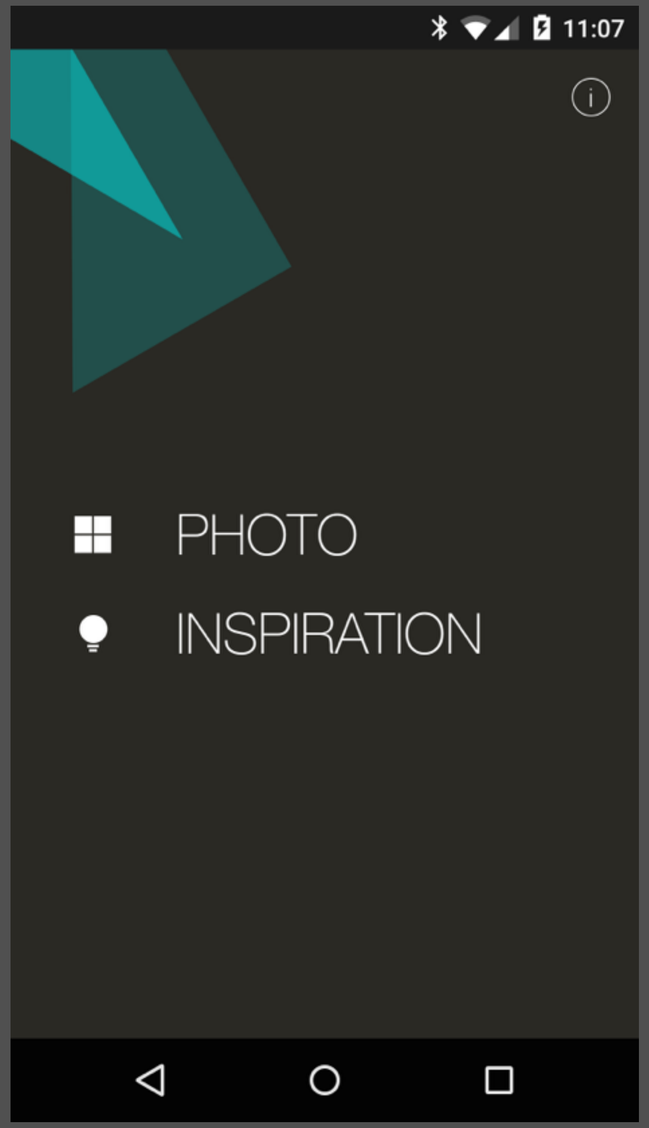

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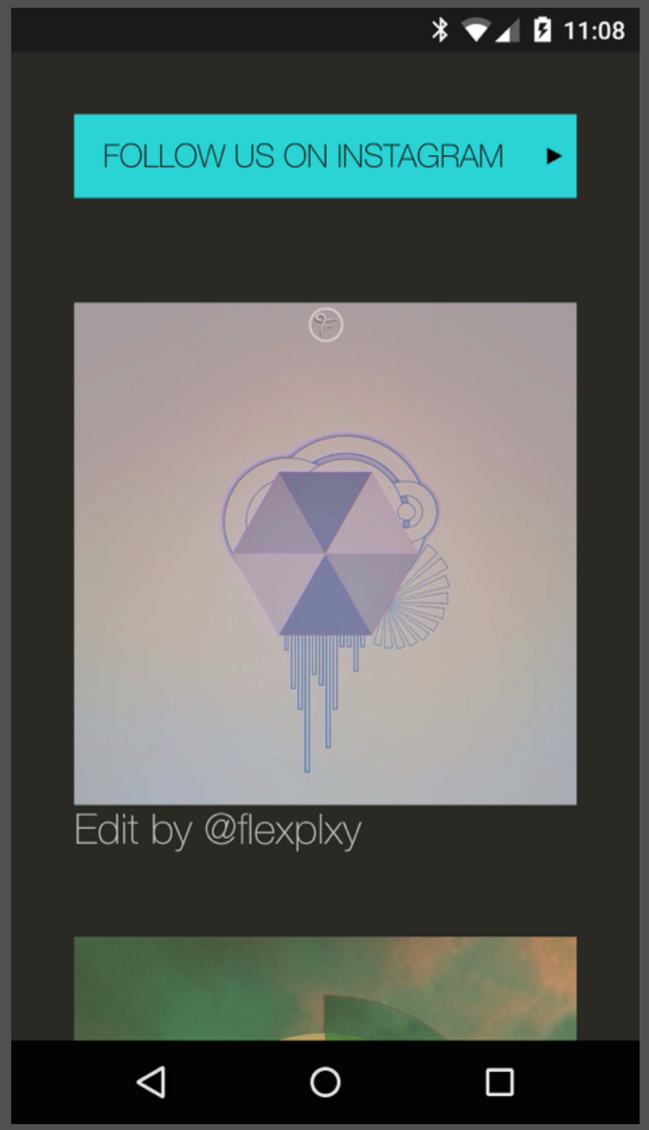

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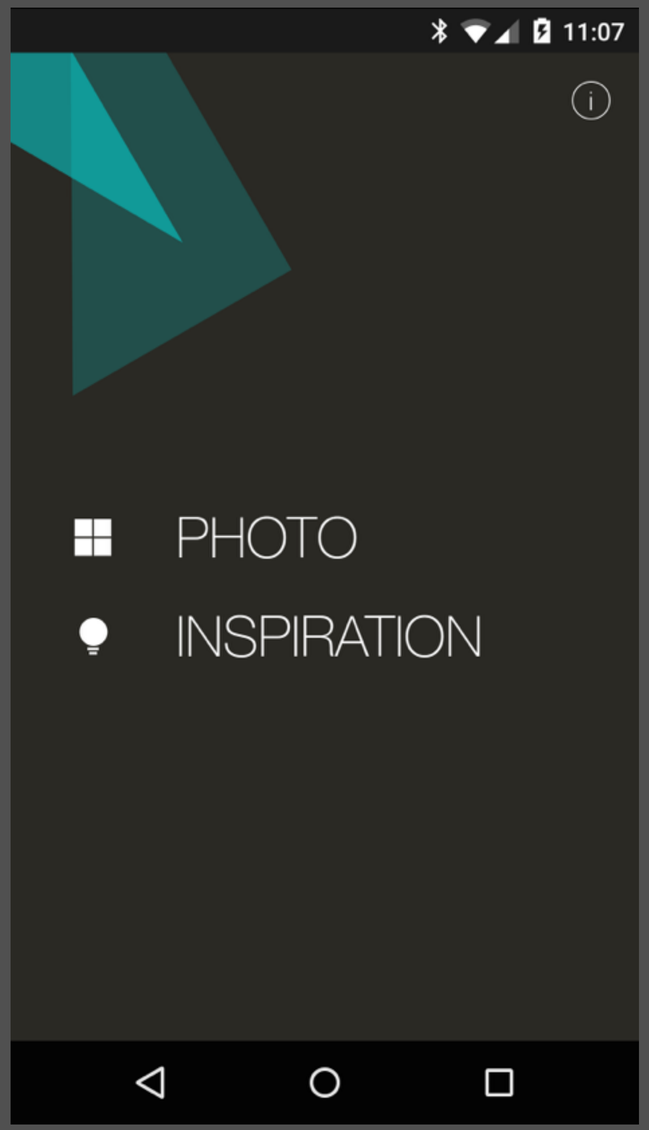

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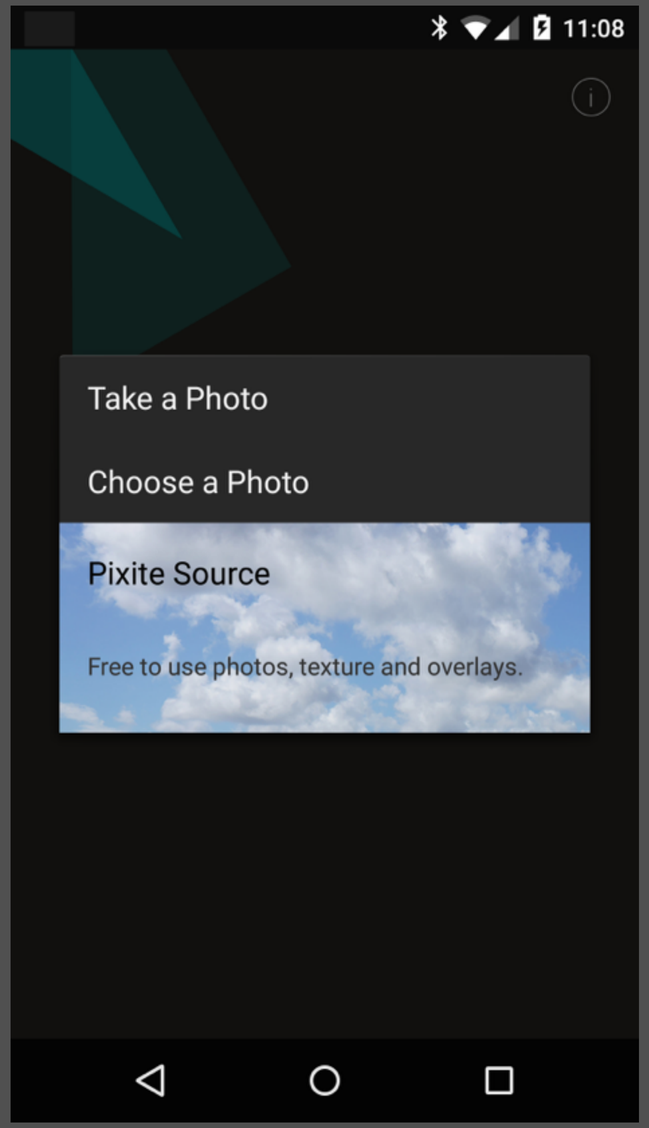
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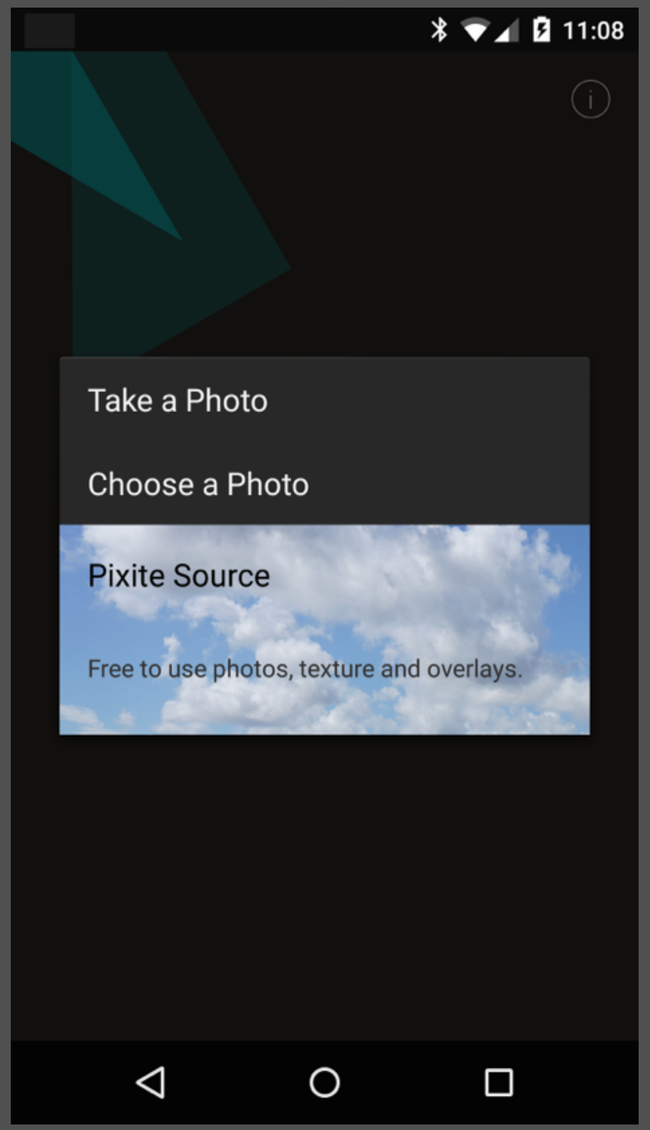
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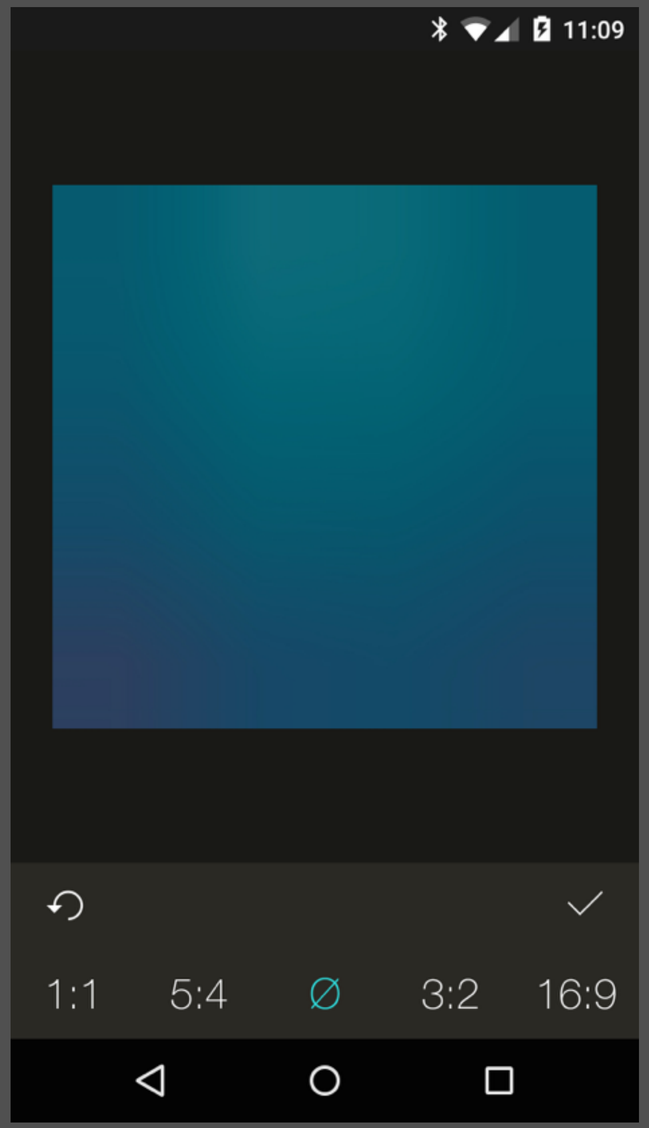
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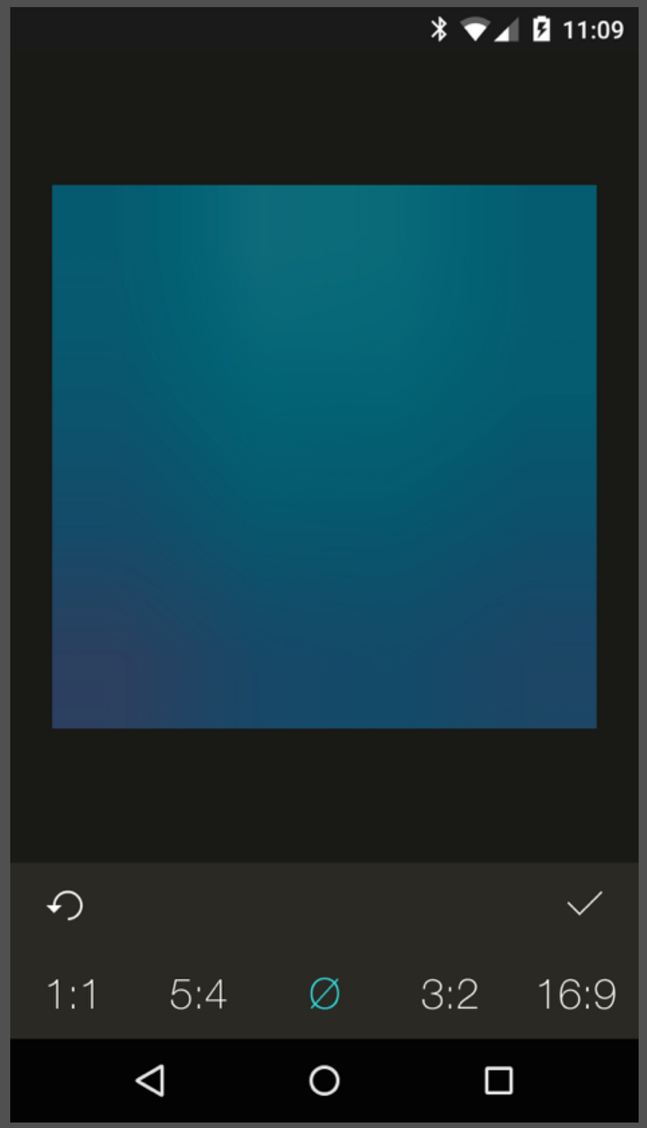

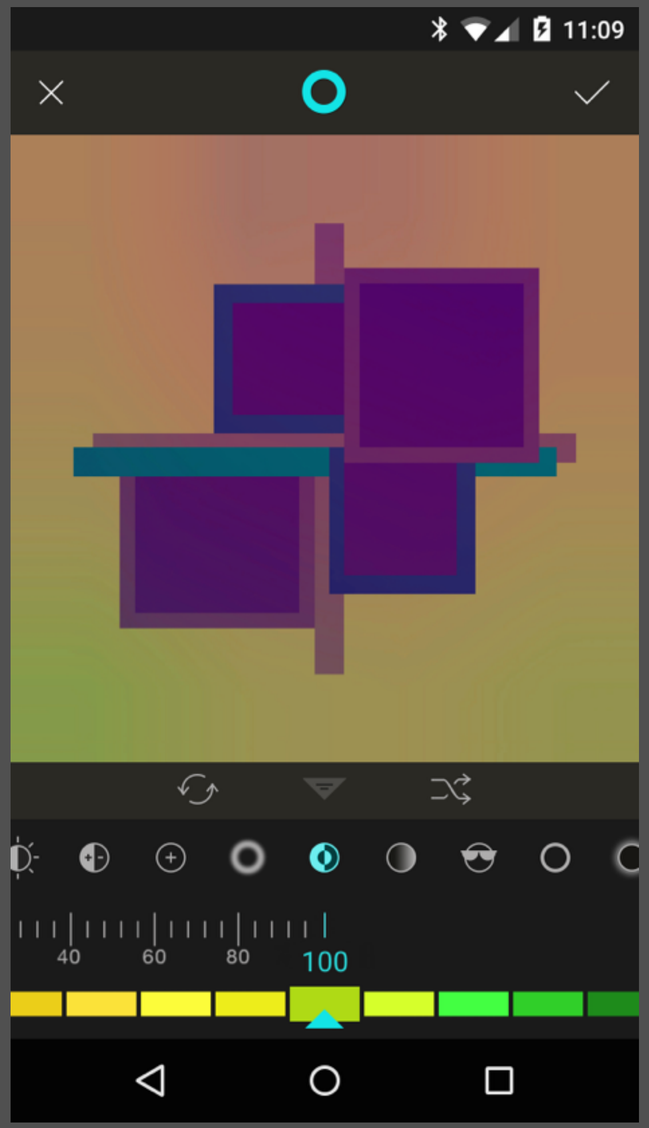

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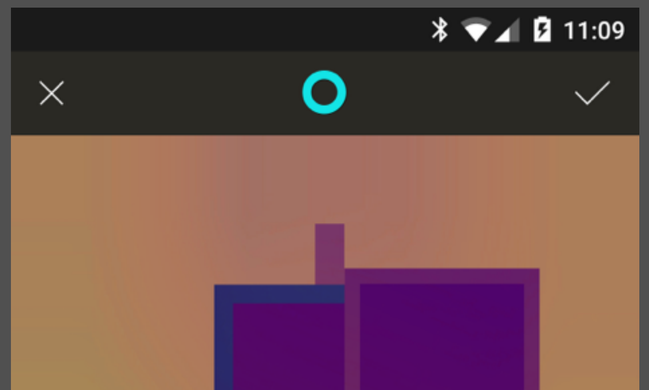
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CLASSICS VOLUME 2
MATERIAL INSPIRATIONS

Fragment


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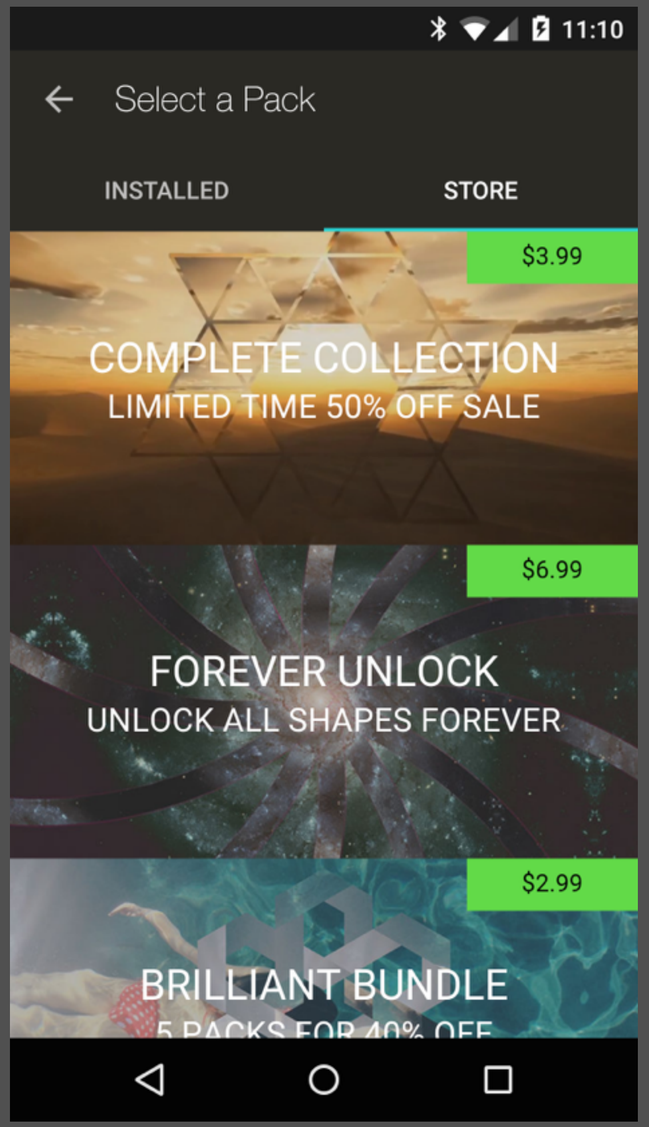
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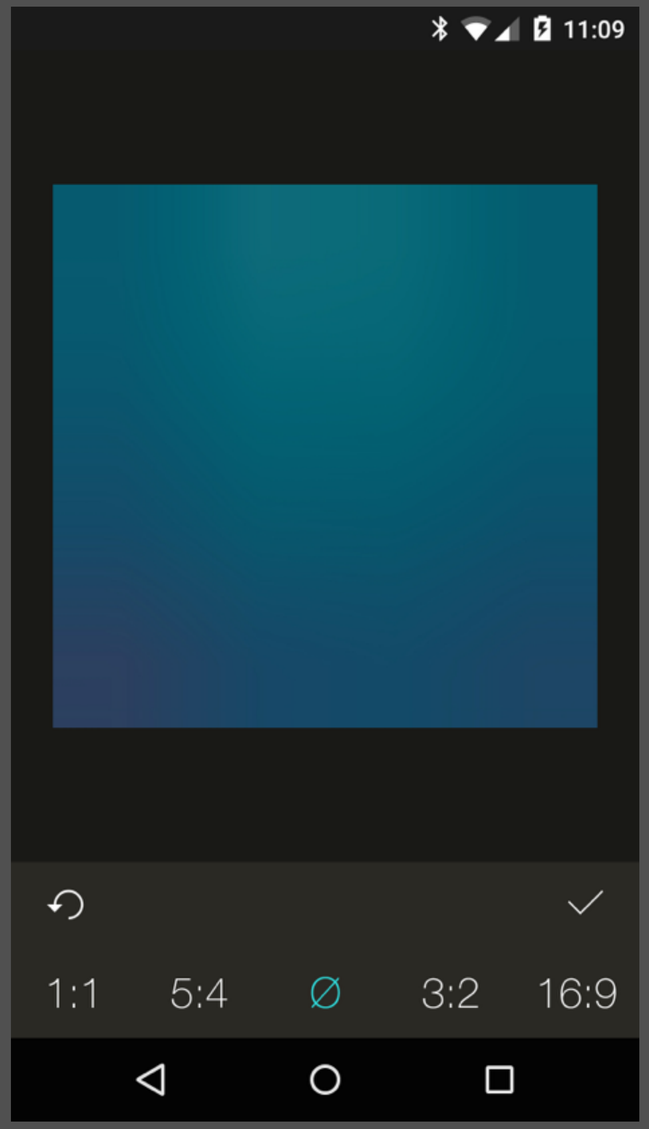
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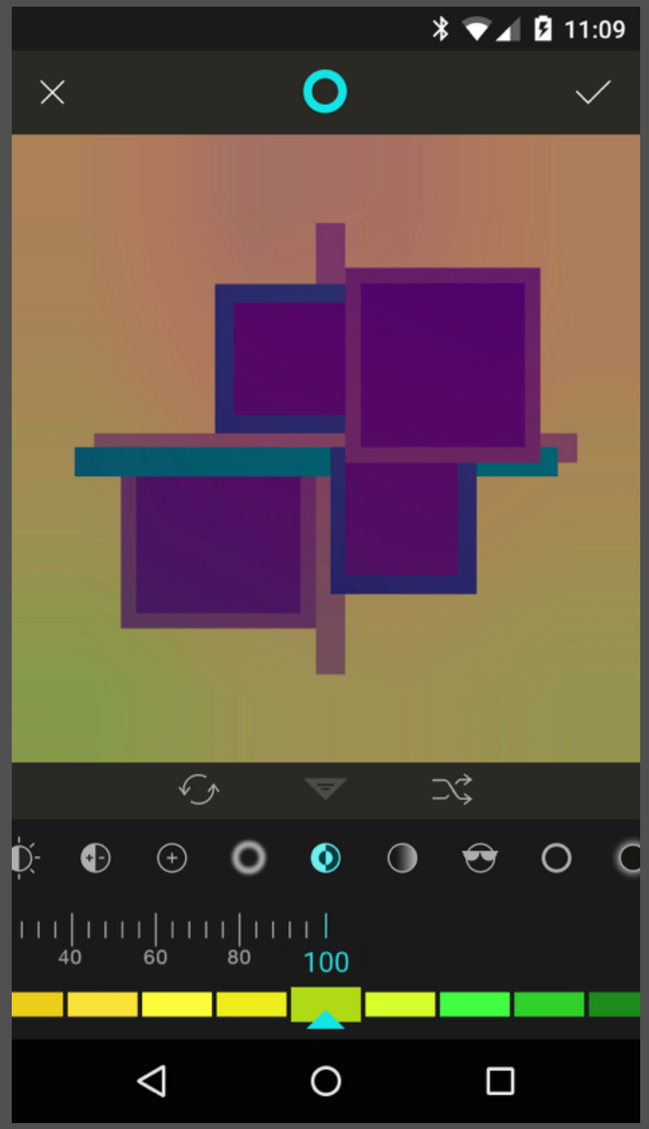
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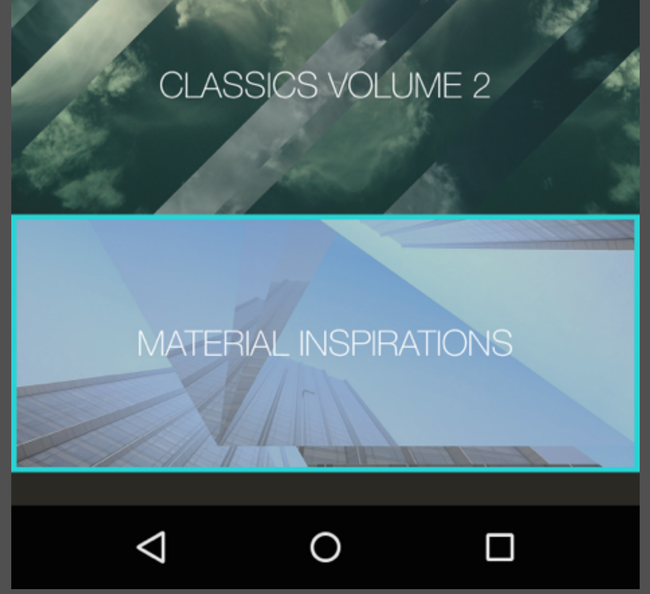
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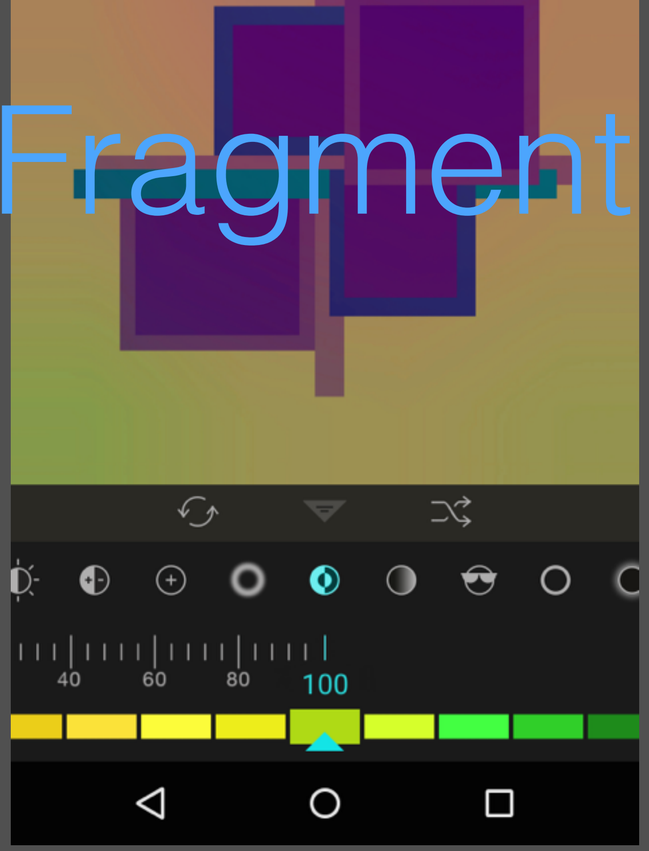
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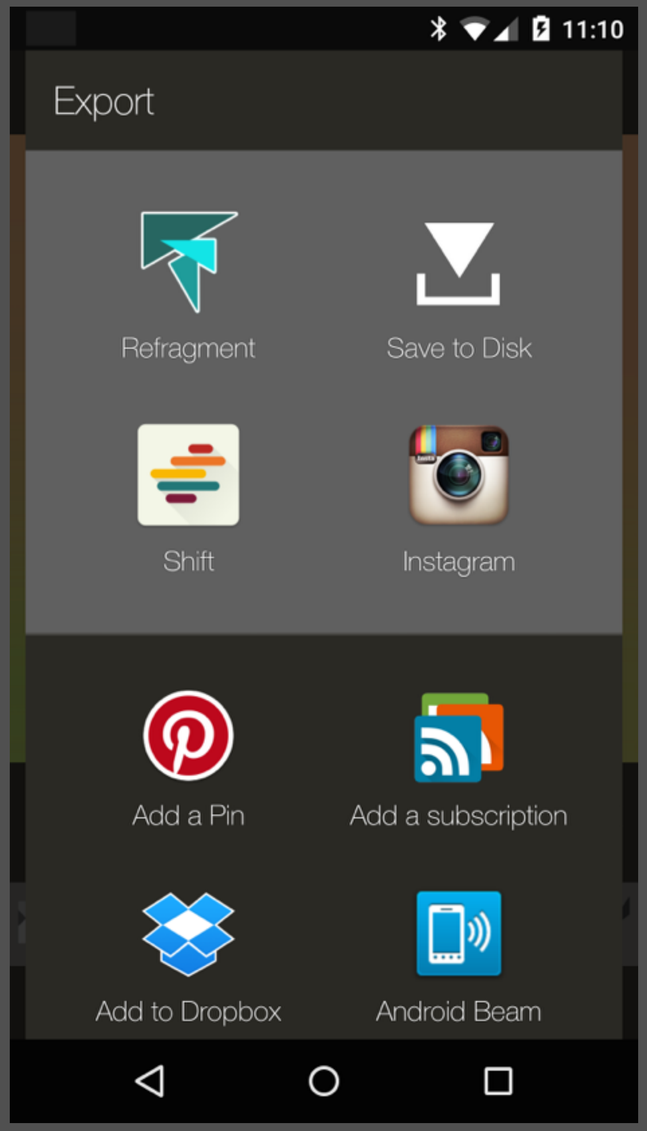
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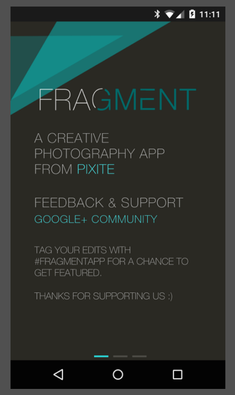
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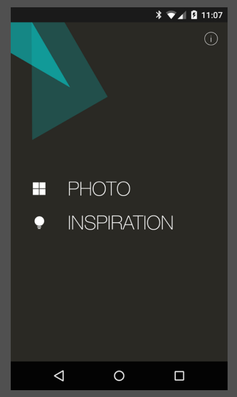
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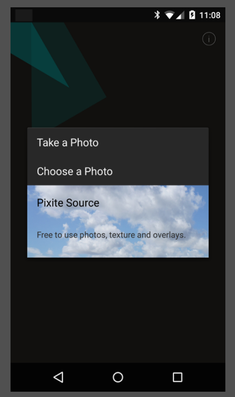
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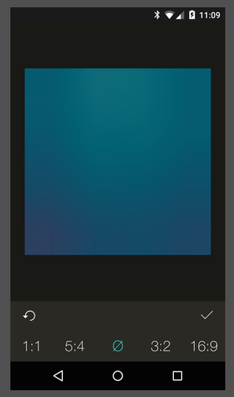
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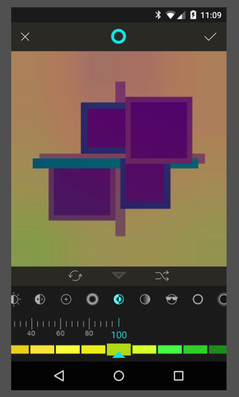
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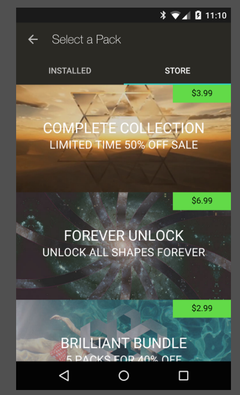
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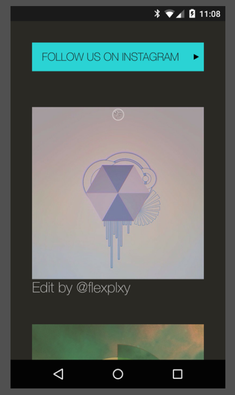
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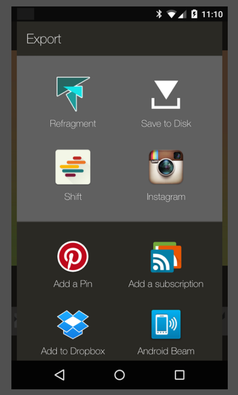
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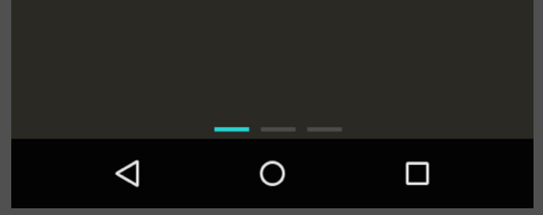


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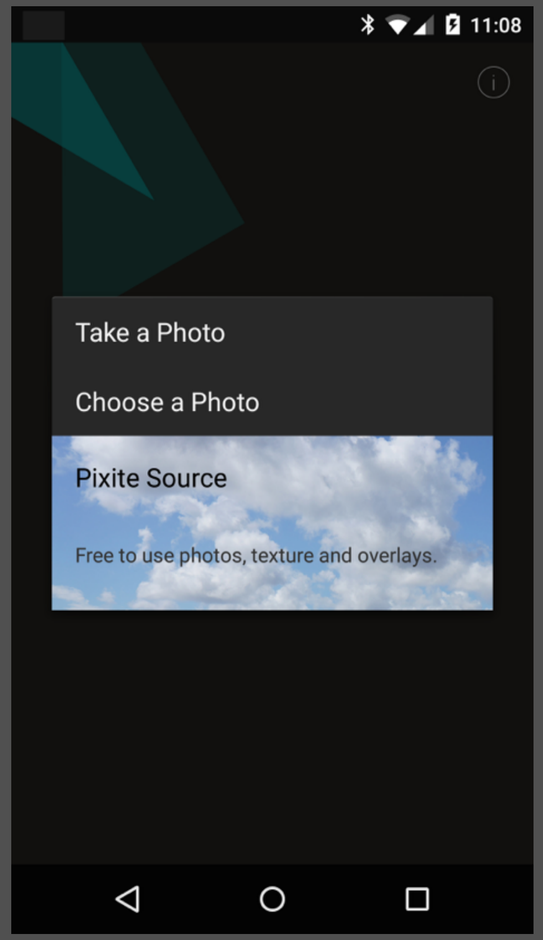
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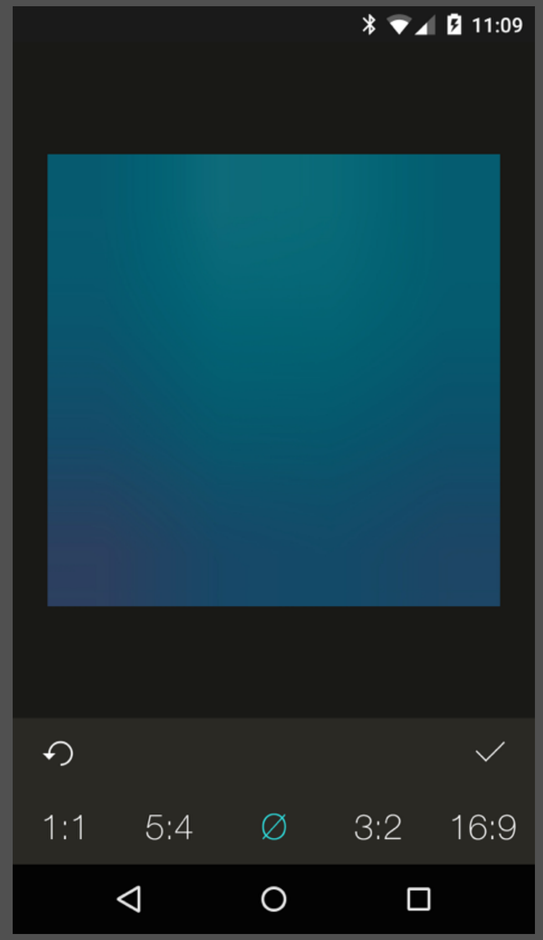
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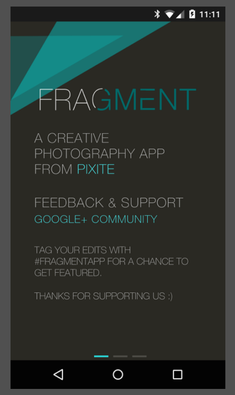
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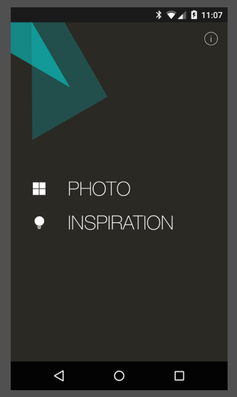
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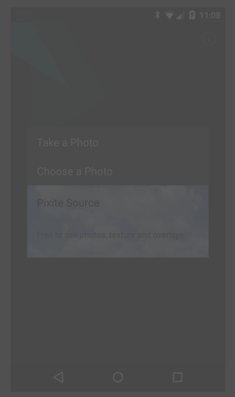
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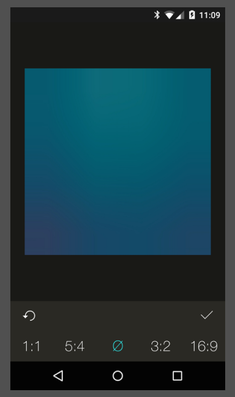
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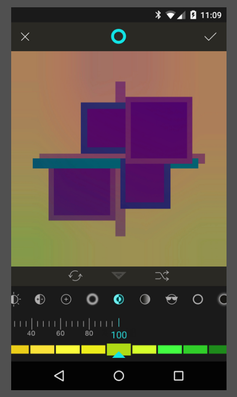
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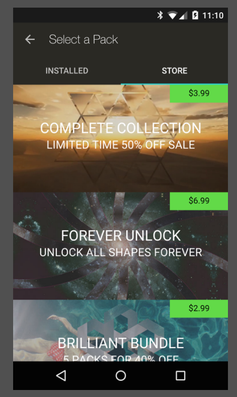
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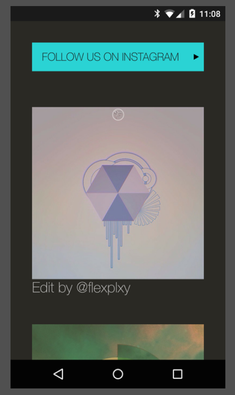
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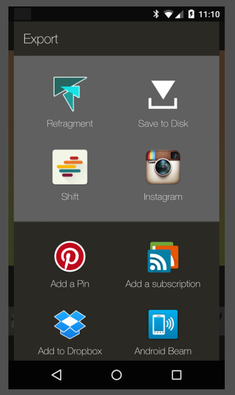
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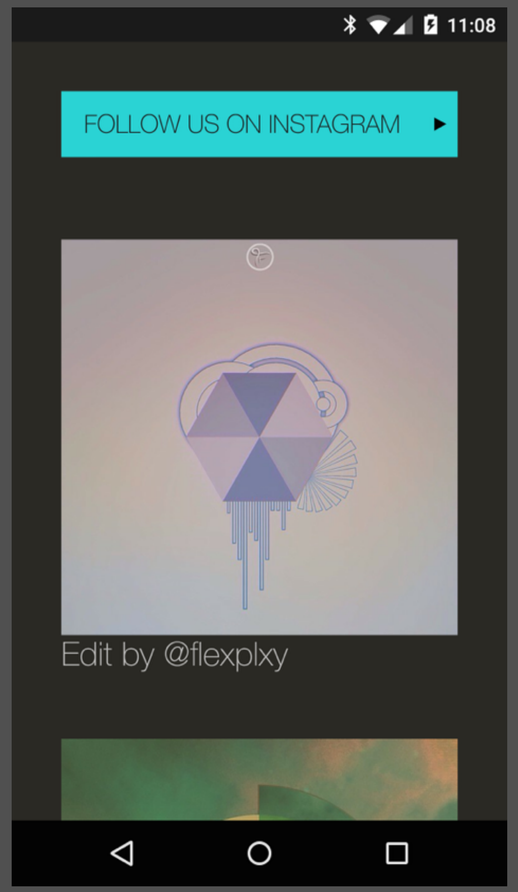

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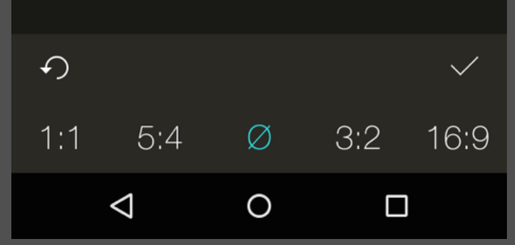
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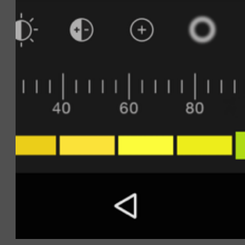
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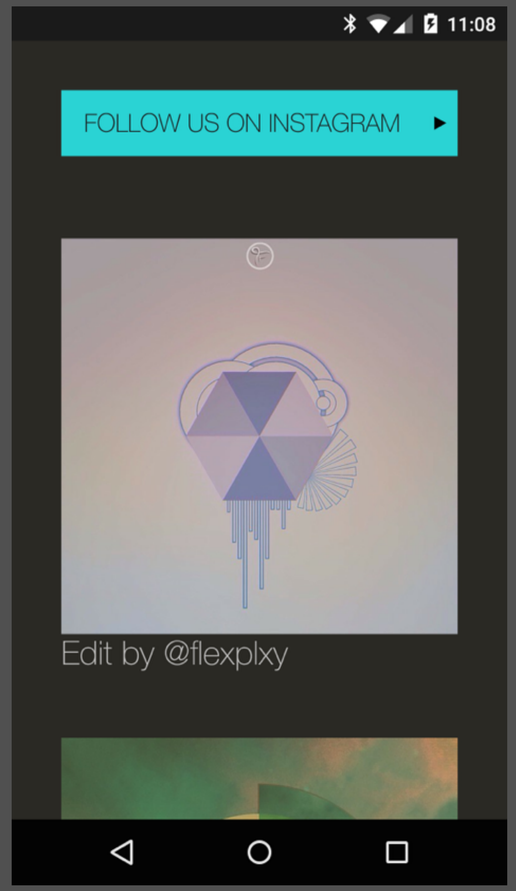
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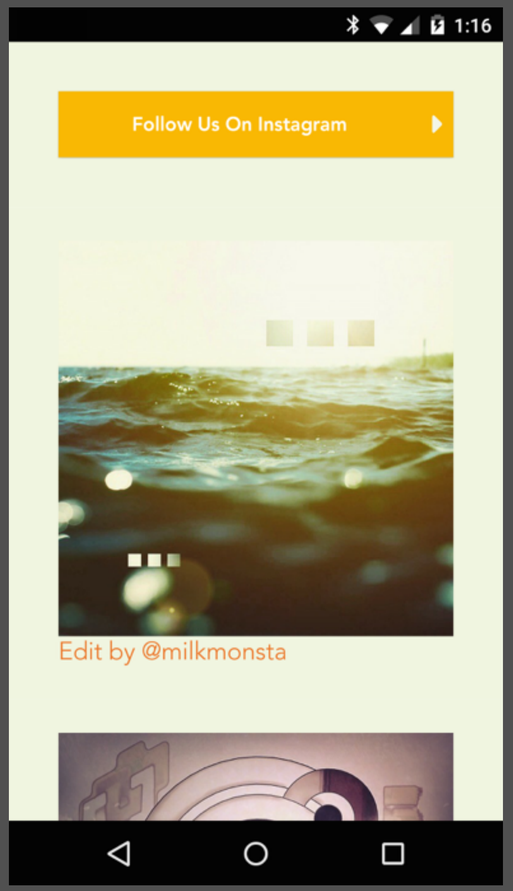
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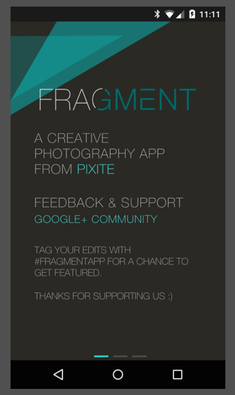
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11:07
PHOTO
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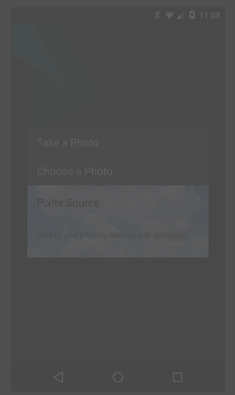
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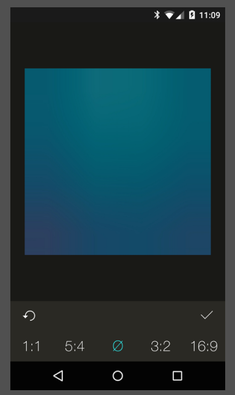
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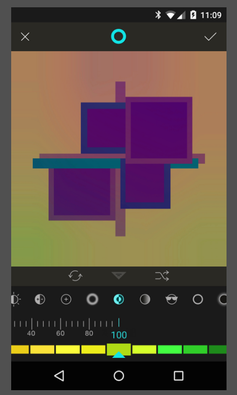
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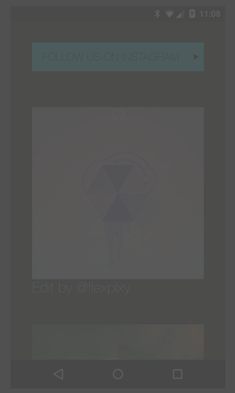
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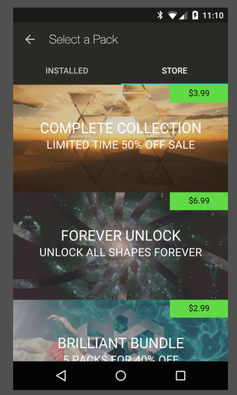
CLASSICS VOLUME 2
MATERIAL INSPIRATIONS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FOREVER UNLOCK
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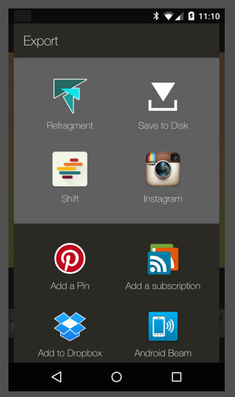
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Add to Dropbox
Android Beam

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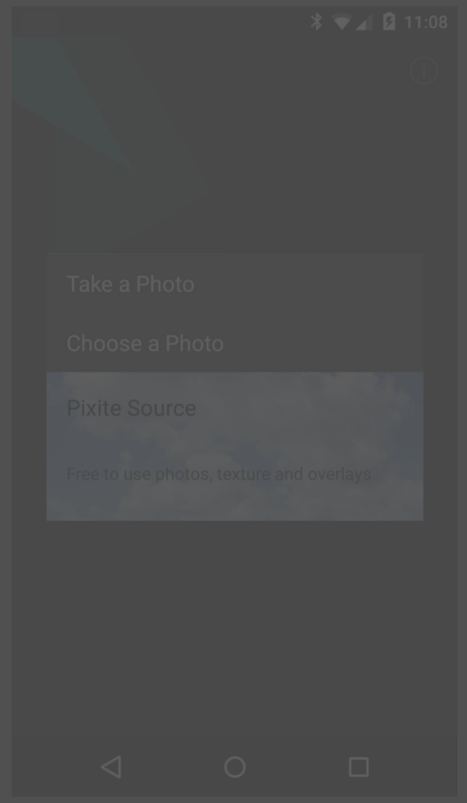
11:07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Take a Photo
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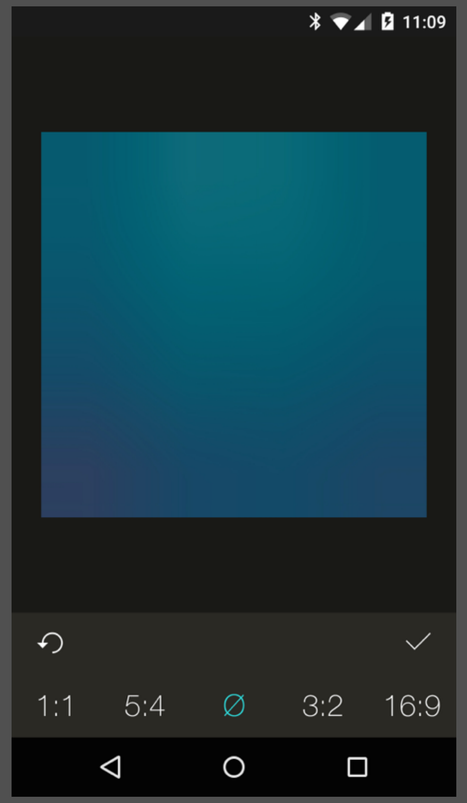
Free to use photos, texture and overlays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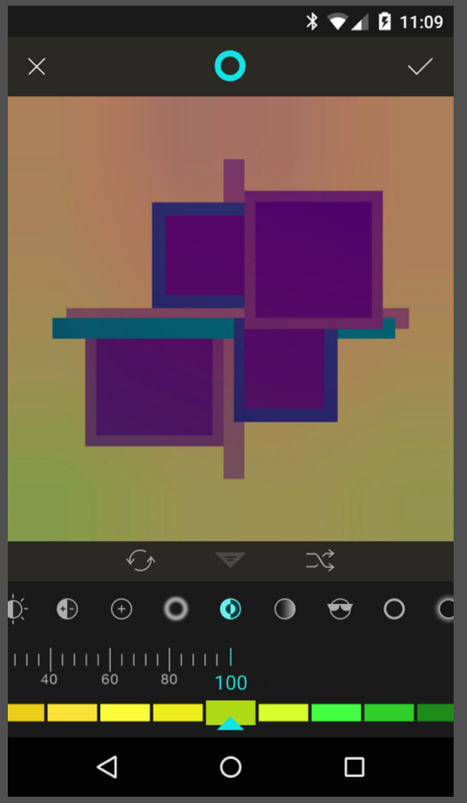
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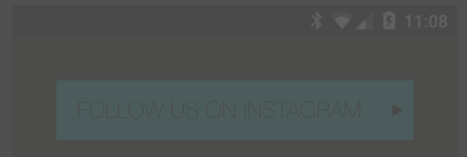
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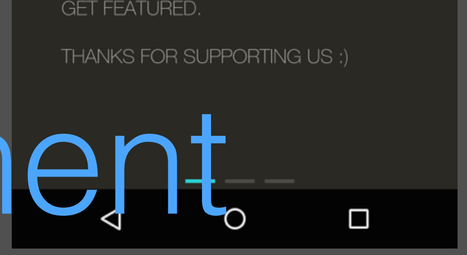
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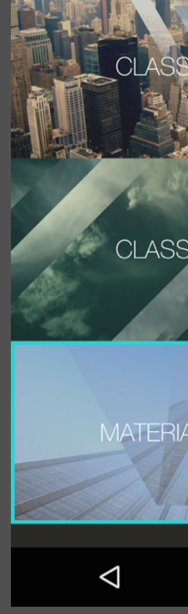
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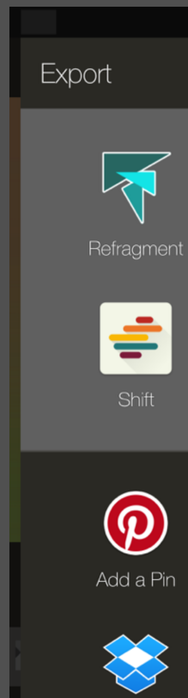
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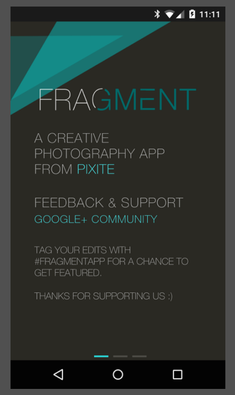
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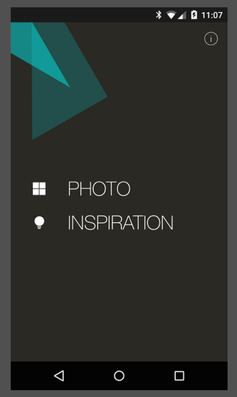
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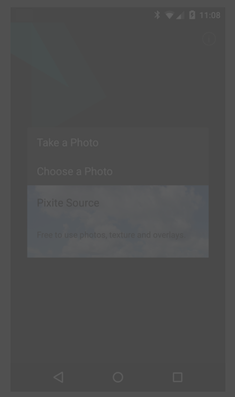
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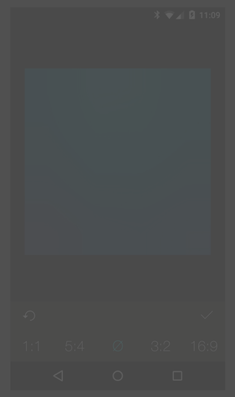
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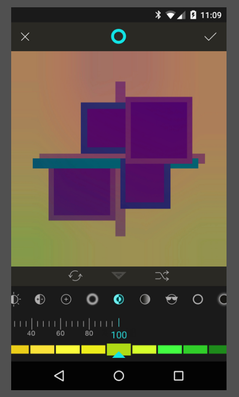
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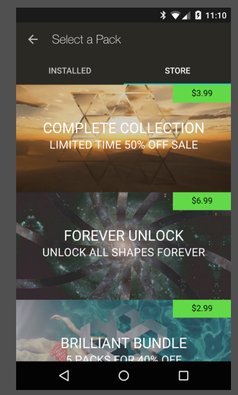
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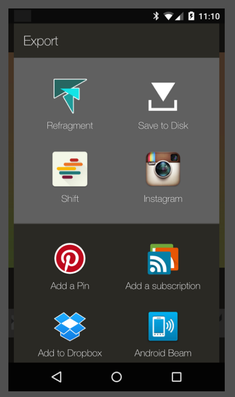
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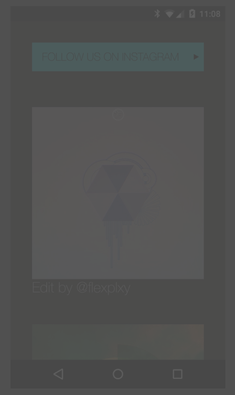
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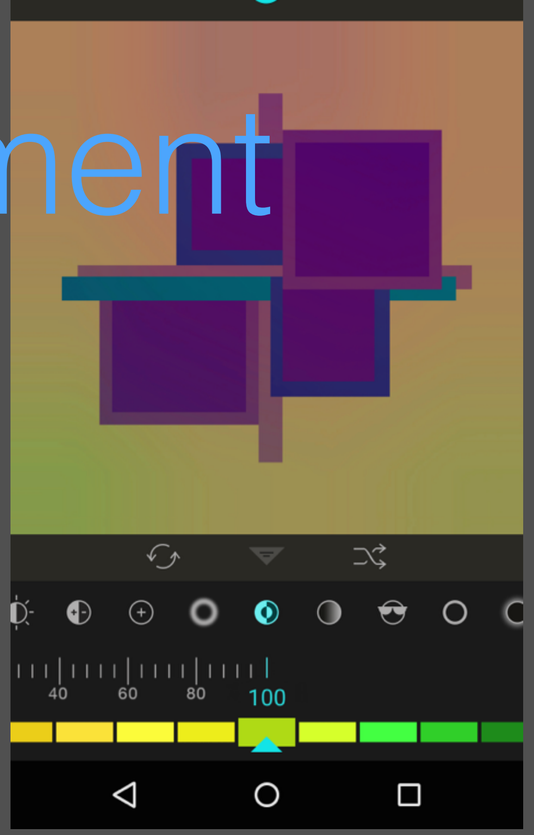
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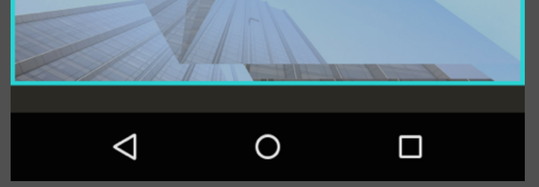


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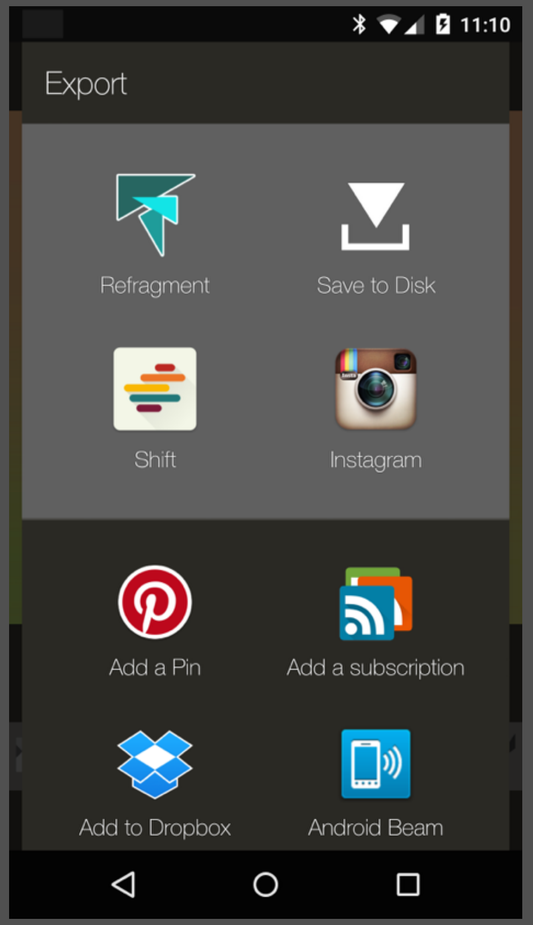
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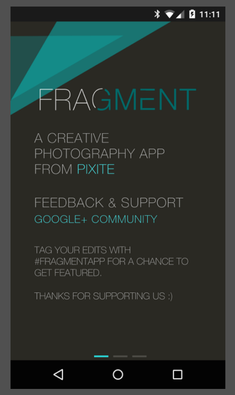
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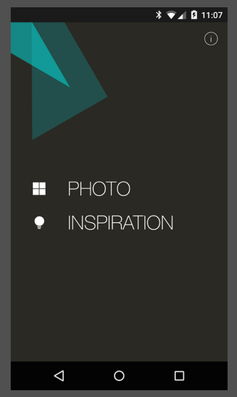
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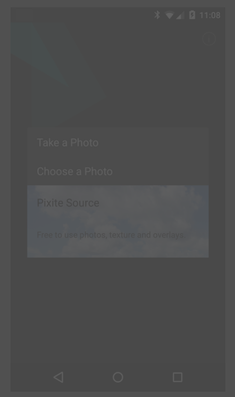
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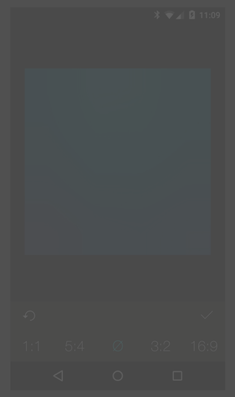
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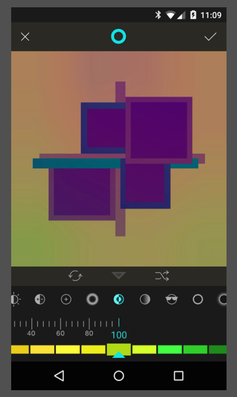
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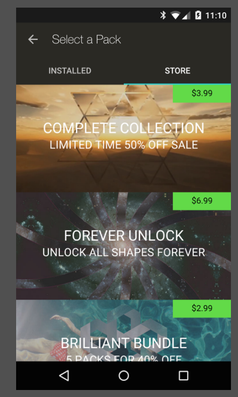
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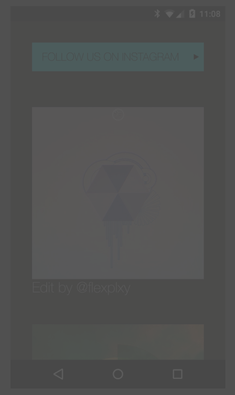
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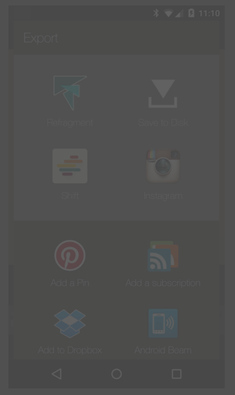
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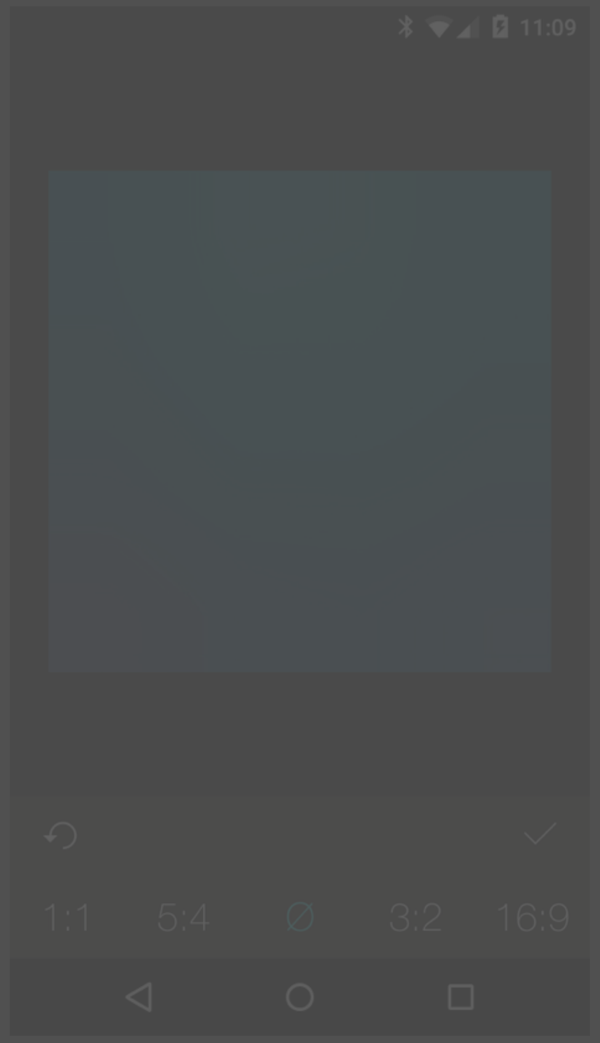
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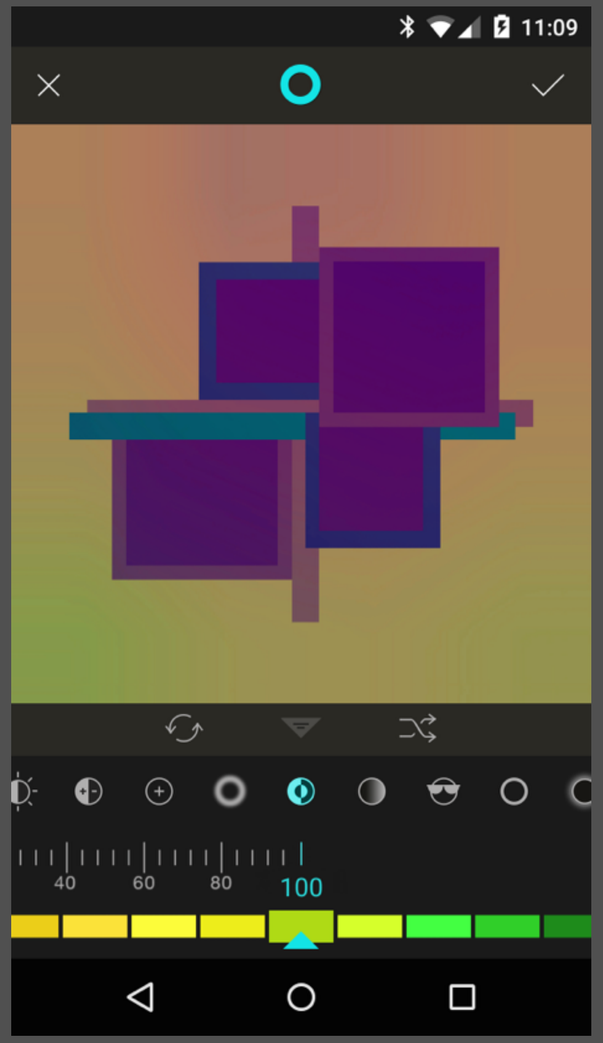
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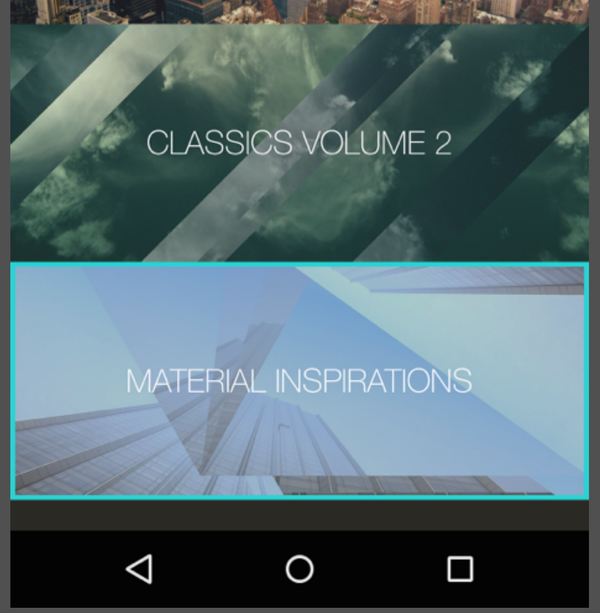
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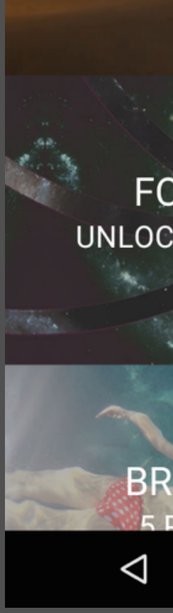
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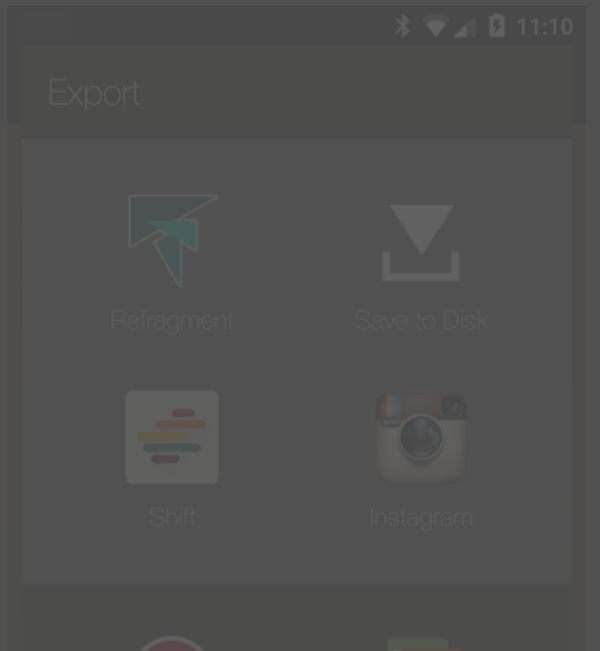
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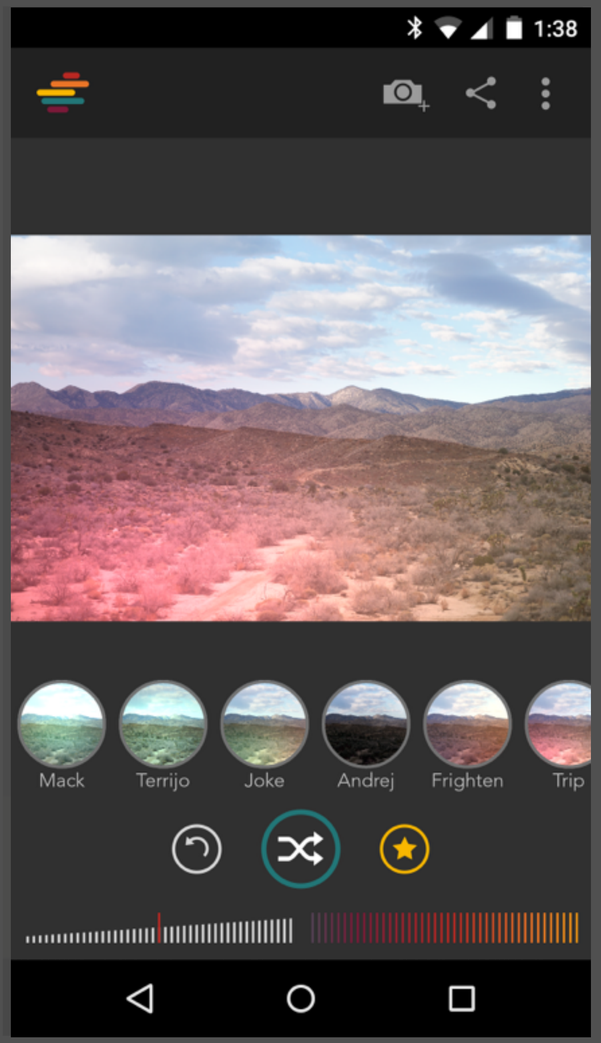
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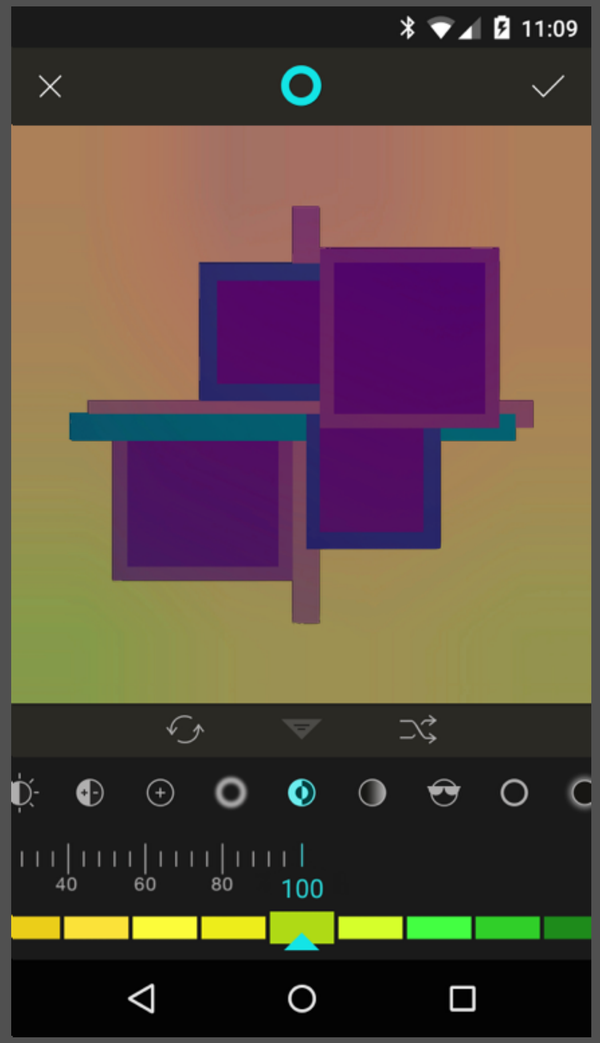
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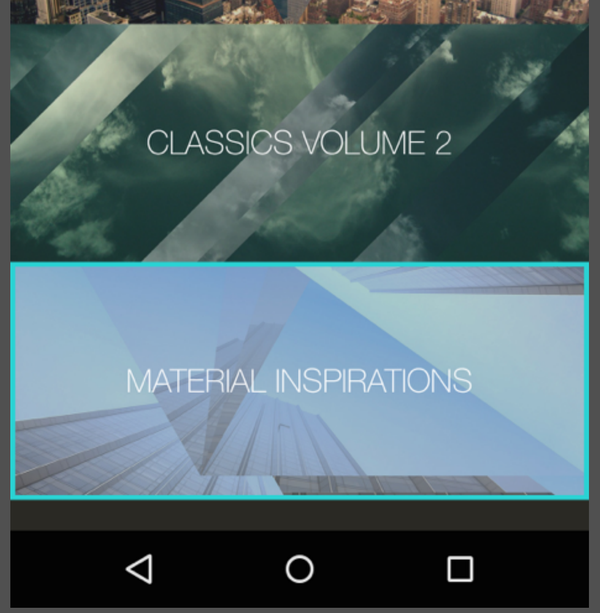
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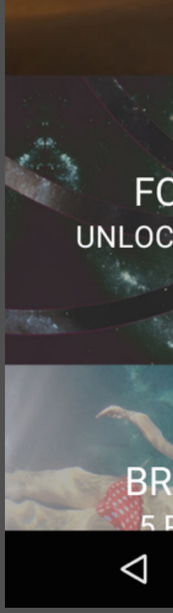
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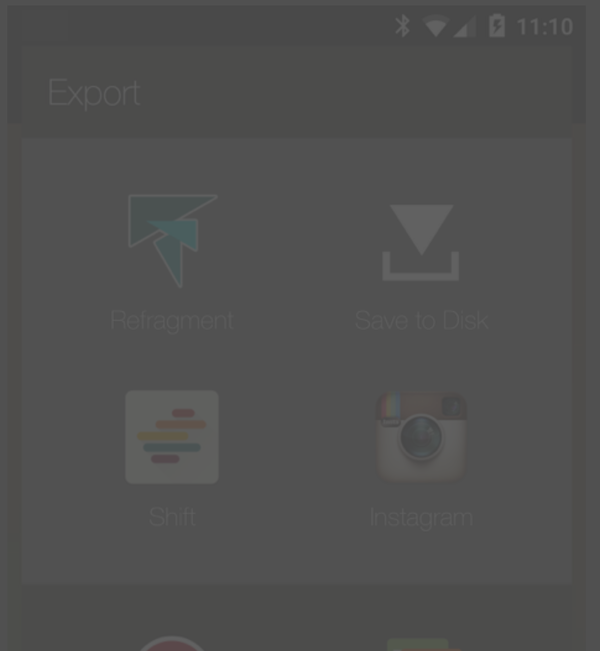
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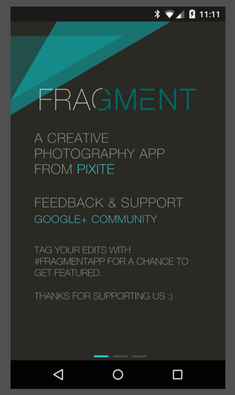
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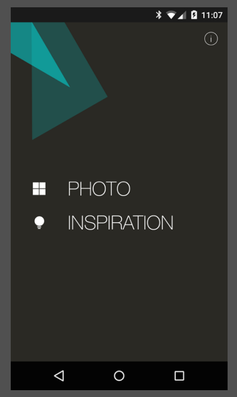
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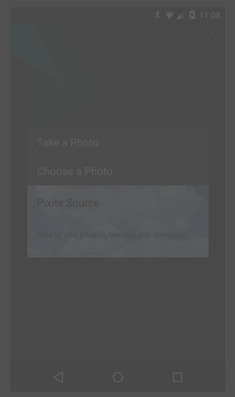
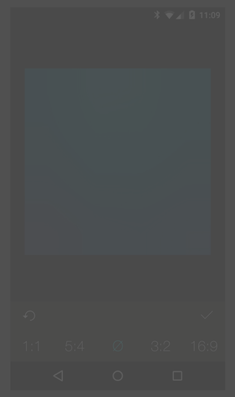
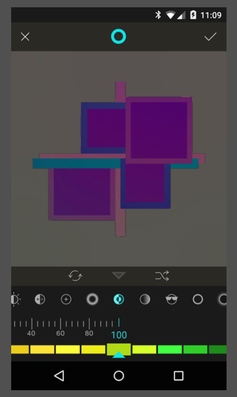
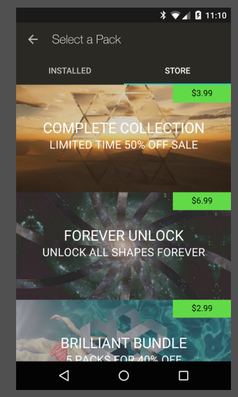
PHOTO
INSPIRATION

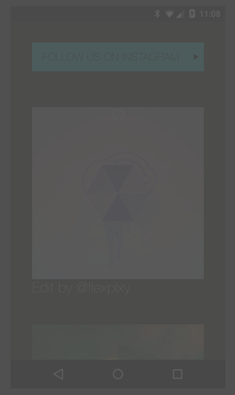

11:08
Take a Photo
Choose a Photo
Pixite Source

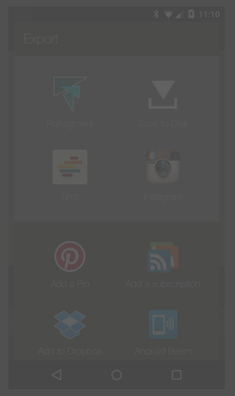

11:09
1:1
5:4
3:2
16:9


11:09
40
60
80
100

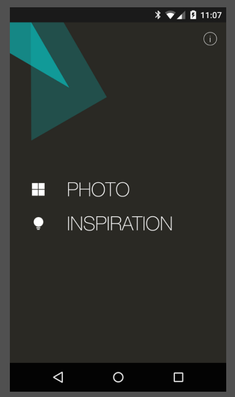

11:10
Select a Pack
INSTALLED
STORE
CLASSICS VOLUME
CLASSICS VOLUME 2
MATERIAL INSPIRATIONS


11:10
Select a Pack
INSTALLED
STORE
$3.99
COMPLETE COLLECTION
LIMITED TIME 50% OFF SALE
$6.99
FOREVER UNLOCK
UNLOCK ALL SHAPES FOREVER
$2.99
BRILLIANT BUNDLE

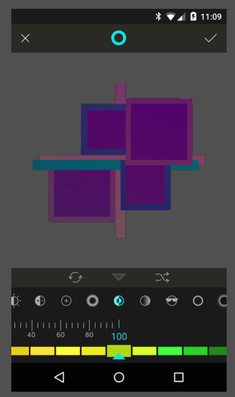

11:08
FOLLOW US ON INSTAGRAM
Edit by @flexpixy


11:10
Export

Fragment


11:07
PHOTO
INSPIRATION


11:11
FRAGMENT
A CREATIVE
PHOTOGRAPHY APP
FROM PIXITE
FEEDBACK & SUPPORT
GOOGLE+ COMMUNITY
TAG YOUR EDITS WITH
#FRAGMENTAPP FOR A CHANCE TO
GET FEATURED.
THANKS FOR SUPPORTING US :)


11:09
40
60
80
100


11:10
Select a Pack
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CLASSICS VOLUME
CLASSICS VOLUME 2
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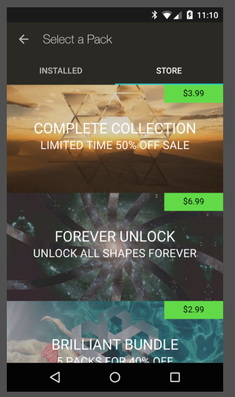
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UNLOCK ALL SHAPES FOREVER
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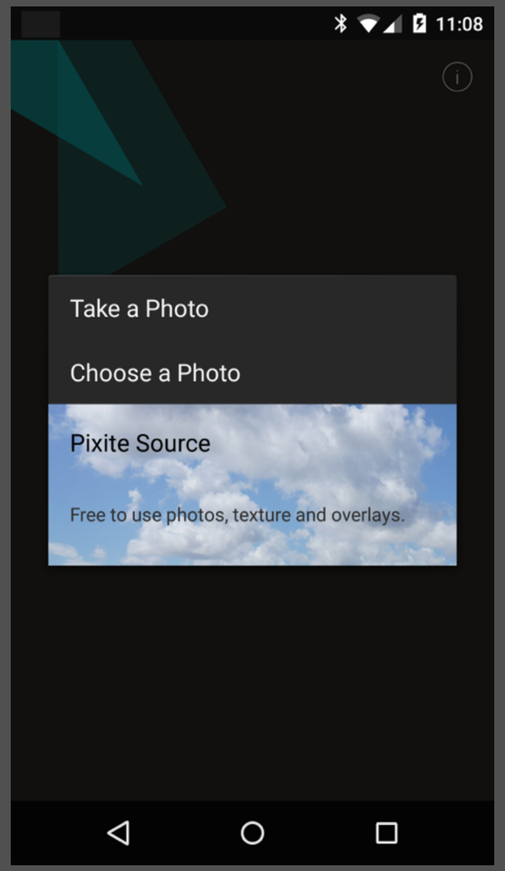
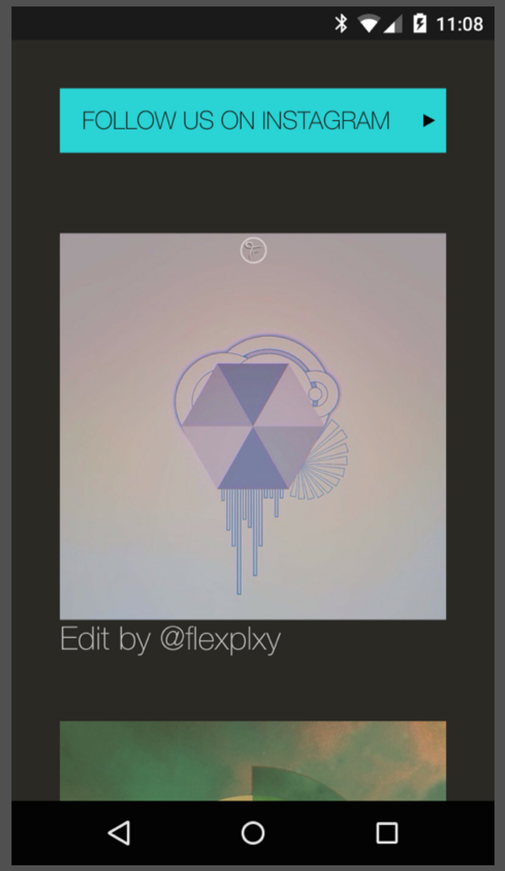
BRILLIANT BUNDLE

Fragment


11:08
Take a Photo
Choose a Photo
Pixite Source
Free to use photos, texture and overlays.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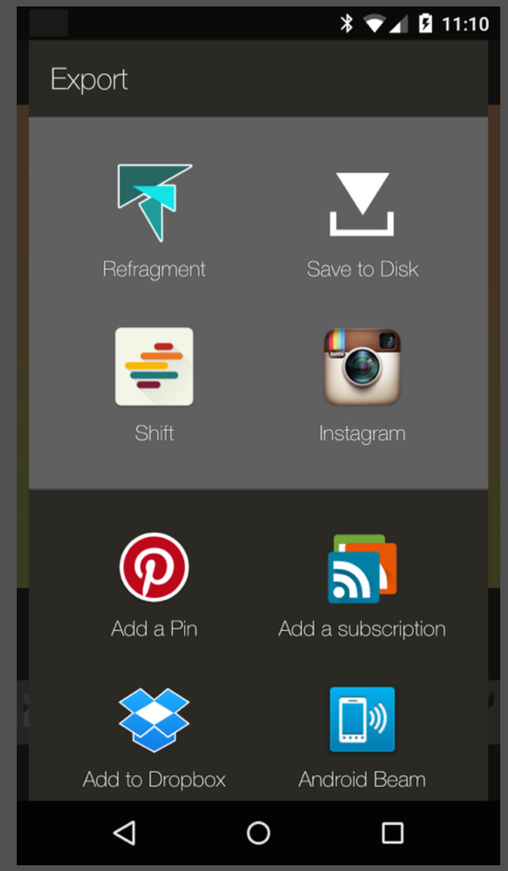
FOLLOW US ON INSTAGRAM
Edit by @flexplxy


11:10
Export
Refragment
Save to Disk
Shift
Instagram
Add a Pin
Add a subscription
Add to Dropbox
Android Beam

Limit Scope and Requirements

Limit Scope and Requirements

- Choose a single problem to solve
  - Picasso - Efficient image loading and caching
  - Retrofit - Easy REST API access
- Avoid “Apache Syndrome”
  - Every Apache library depends on every other Apache library

Limit Scope and Requirements

- Library mission statement
  - One sentence
  - What the library does

“Allow the user to load an image from any source.”

Limit Scope and Requirements

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  - One sentence
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"Allow the user to load an image from any source."

Limit Scope and Requirements

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"Allow the user to load an image from any source."

Limit Scope and Requirements

- Library mission statement
  - One sentence
  - What the library does

“Allow the user to load an image from any source.”

Design a Good API

Design a Good API

- Who is your user?
- If user needs to mess with code, it’s not a library
- Design from the outside in
- Package your library

API Strategies - Utility

Requirements: Persist filter state to support undo/redo.

API Strategies - Utility

Requirements: Persist filter state to support undo/redo.

```
public interface HistoryManager<T> {

  public T undo();

  public T redo();

  public void push(T state);

  public void clear();
}
```

API Strategies - Utility

Requirements: Persist filter state to support undo/redo.

```
public class HistoryManager<T> {

  public T undo() { … }

  public T redo() { … }

  public void push(T state) { … }

  public void clear() { … }
}
```

API Strategies - Utility

Requirements: Persist filter state to support undo/redo.

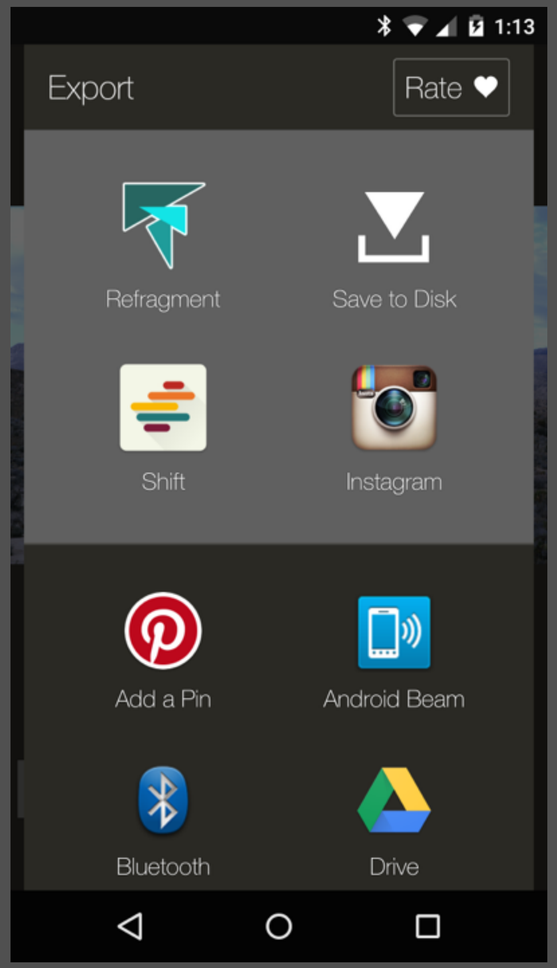
```
public class HistoryManager<T> {

  public HistoryManager(File file) { … }

  public T undo() { … }

  public T redo() { … }

  public void push(T state) { … }

  public void clear() { … }
}
```

API Strategies - Utility

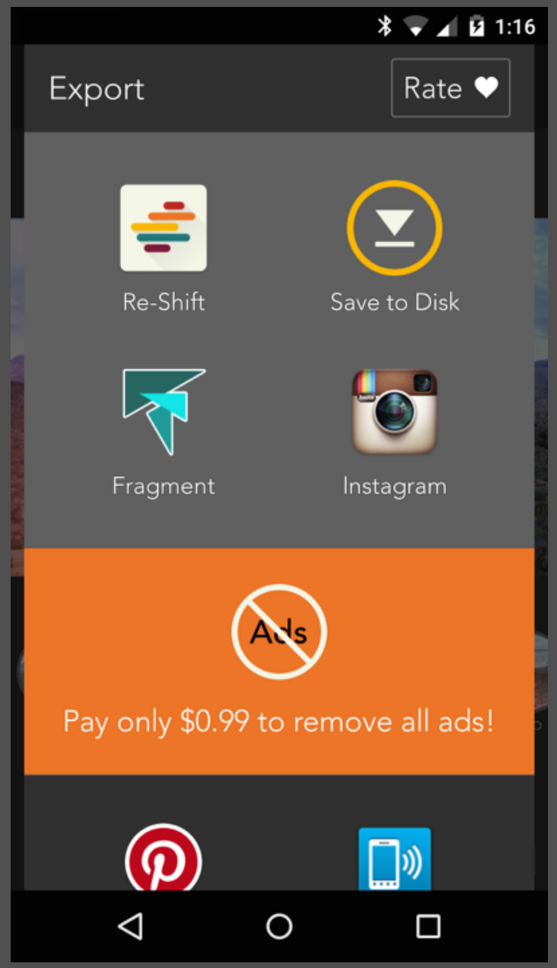
Requirements: Persist filter state to support undo/redo.

```
public class HistoryManager<T> {

  public HistoryManager(File file) { … }

  public T undo() { … }

  public boolean canUndo() { … }

  public T redo() { … }

  public boolean canRedo() { … }

  public void push(T state) { … }

  public void clear() { … }
}
```

API Strategies - Superclass



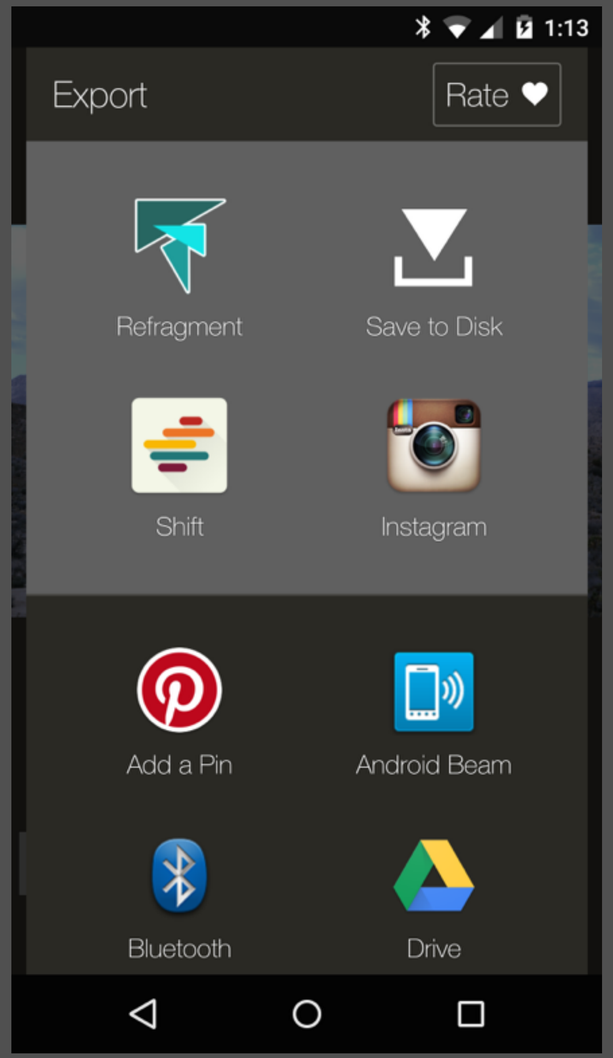
Fragment



Shift

API Strategies - Superclass

```
public class BaseExportActivity extends Activity {

  /**
   * Returns a list of preferred packages which appear above the
   * divider with a slightly larger icon than the rest.
   *
   * @return  the package ids of the preferred packages.
   */
  protected List<String> getPreferredPackages() {
    return DEFAULT_PREFERRED_PACKAGES;
  }

  /**
   * @return the public folder name to save files to.
   */
  protected File getSaveFolder() {
    return new File(getPublicPicturesDirectory(), "Pixite");
  }

  /**
   * Allows the AppInfo to be updated for things like Refragment or
   * Refilter. Default implementation does nothing.
   *
   * @param info The app info to update.
   */
  protected void updateAppInfo(AppInfo info) {
  }

}
```



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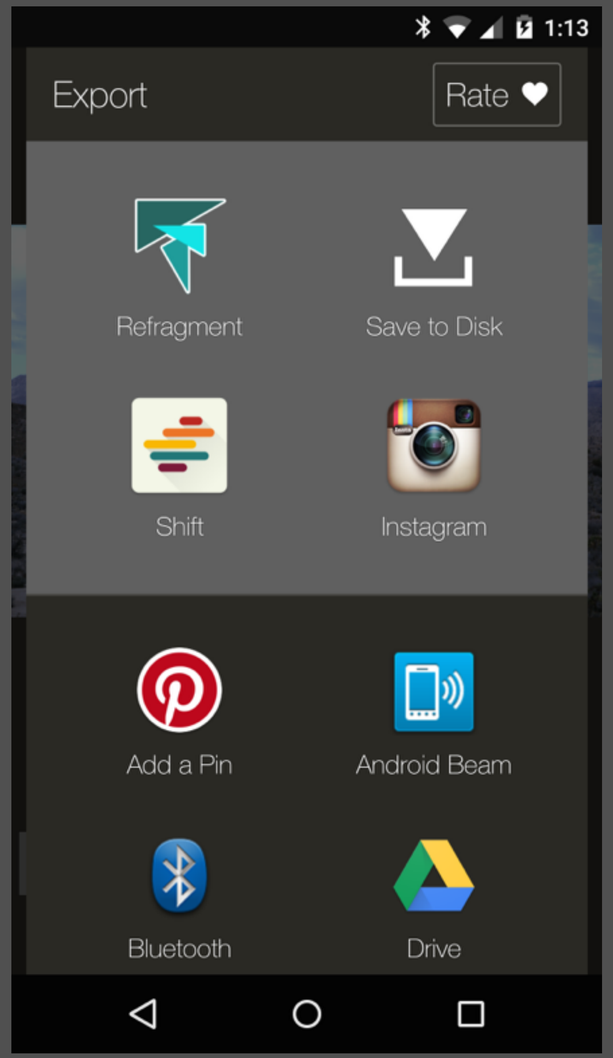

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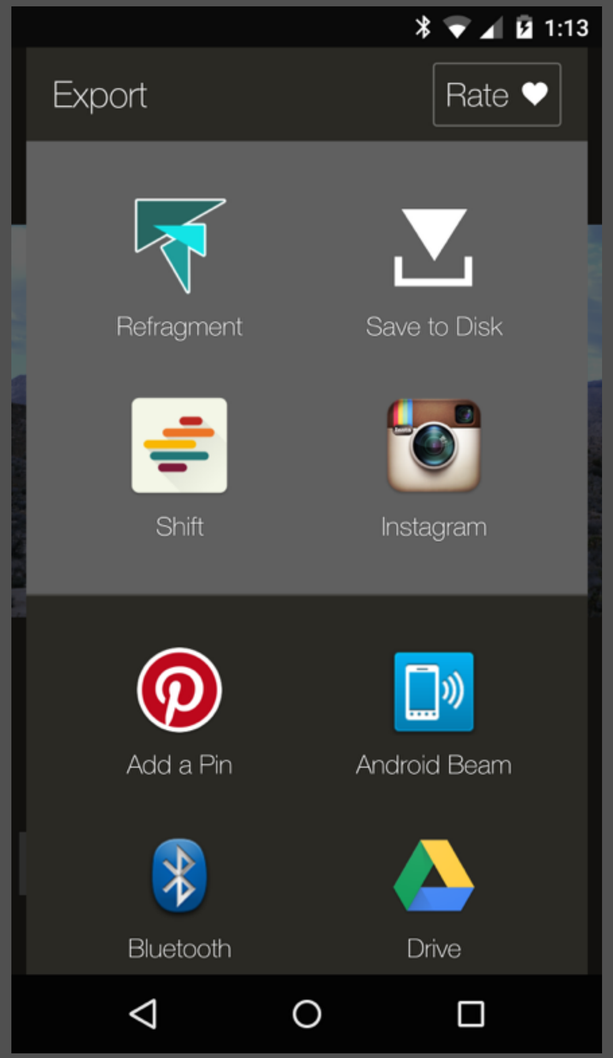

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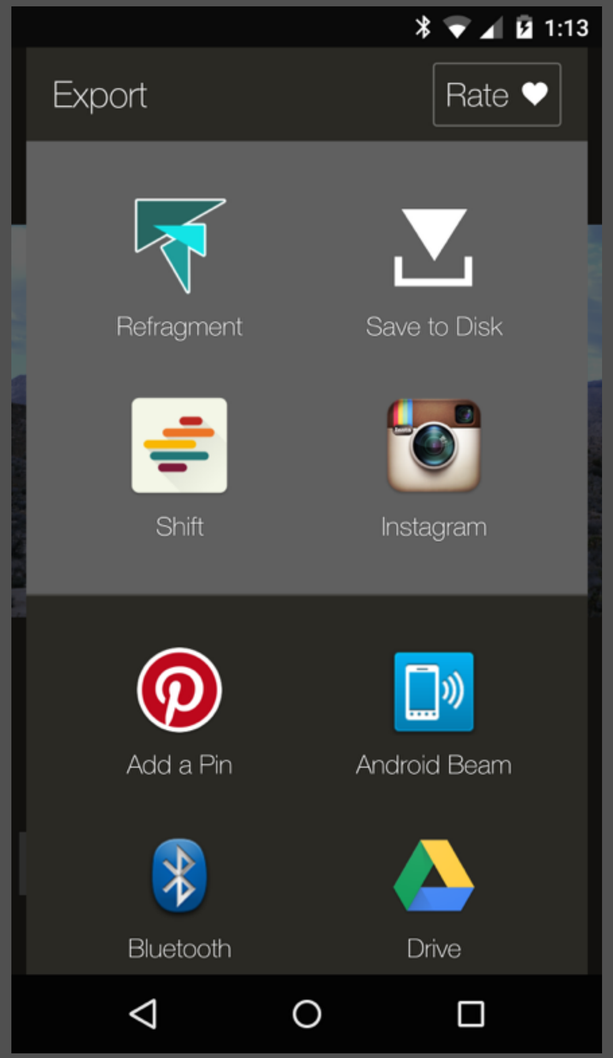
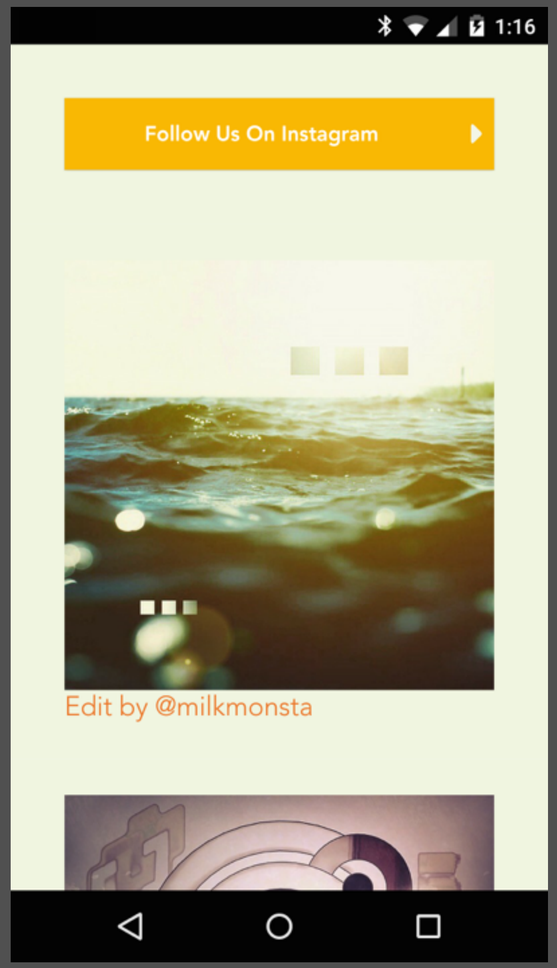


API Strategies - Isolated Activity

Fragment



Shift

API Strategies - Isolated Activity

```
Intent i = new Intent(context, InspirationActivity.class);
i.putExtra(EXTRA_USER_ID, "1234567890");
i.putExtra(EXTRA_ACCESS_TOKEN, "super_secret_access_token");
i.putExtra(EXTRA_SKIP_TAG, "fragmentpromo");
i.putExtra(EXTRA_USERNAME, "fragmentapp");
startActivity(i);
```

API Strategies - Isolated Activity

```
<FrameLayout
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    style="?attr/inspirationActivityStyle">

    <ListView
        android:id="@android:id/list"
        style="?attr/inspirationListStyle"/>

    <TextView
        android:id="@+id/error"
       style="?attr/inspirationTextStyle"/>

</FrameLayout>
```

API Strategies - Isolated Activity

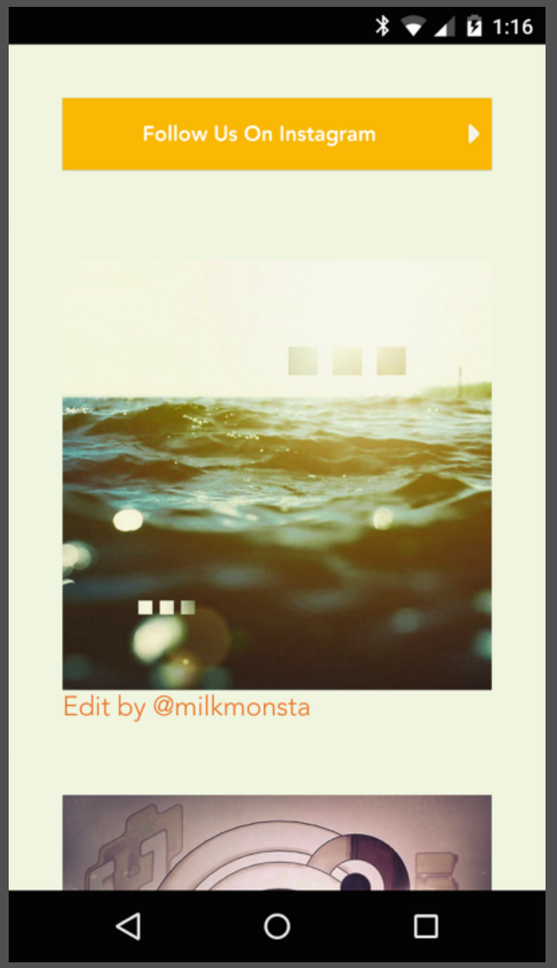
```
<FrameLayout
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    style="?attr/inspirationActivityStyle">

    <ListView
        android:id="@android:id/list"
        style="?attr/inspirationListStyle"/>

    <TextView
        android:id="@+id/error"
       style="?attr/inspirationTextStyle"/>

</FrameLayout>
```

API Strategies - Isolated Activity

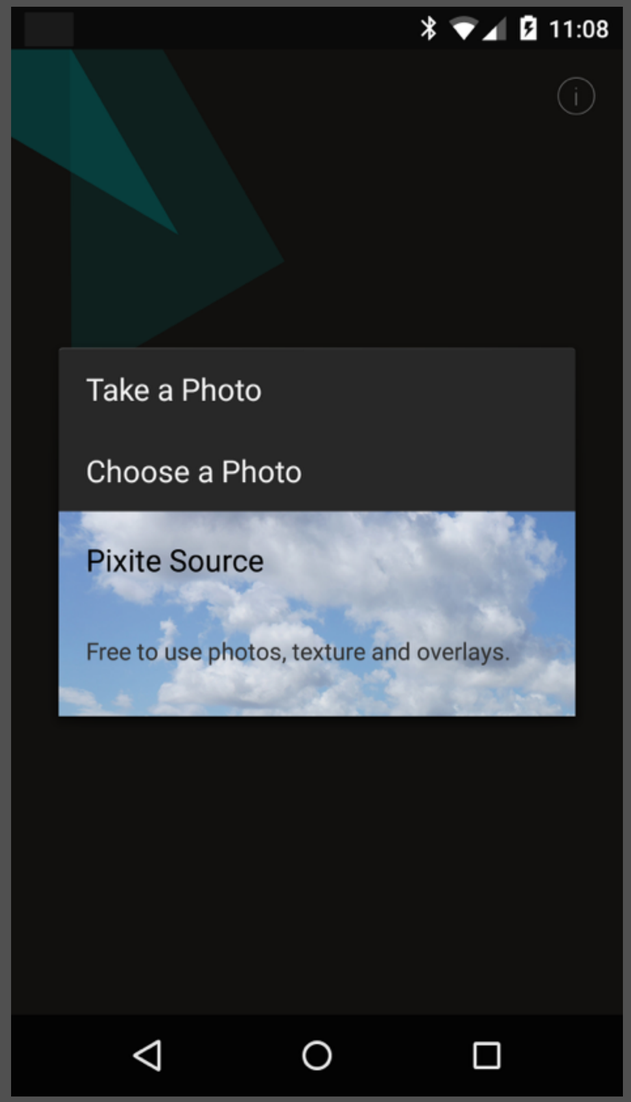
```
<style name="AppTheme" parent="Theme.AppCompat.NoActionBar">

  <item name="inspirationActivityStyle">@style/FragmentInspirationStyle</item>
  <item name="inspirationListStyle">@style/FragmentInspListStyle</item>
  <item name="inspirationTextStyle">@style/FragmentInspTextStyle</item>

</style>
```

API Strategies - Isolated Activity

```
<style name="AppTheme" parent="Theme.AppCompat.NoActionBar">

  <item name="inspirationActivityStyle">@style/ShiftInspirationStyle</item>
  <item name="inspirationListStyle">@style/ShiftInspListStyle</item>
  <item name="inspirationTextStyle">@style/ShiftInspTextStyle</item>

</style>
```

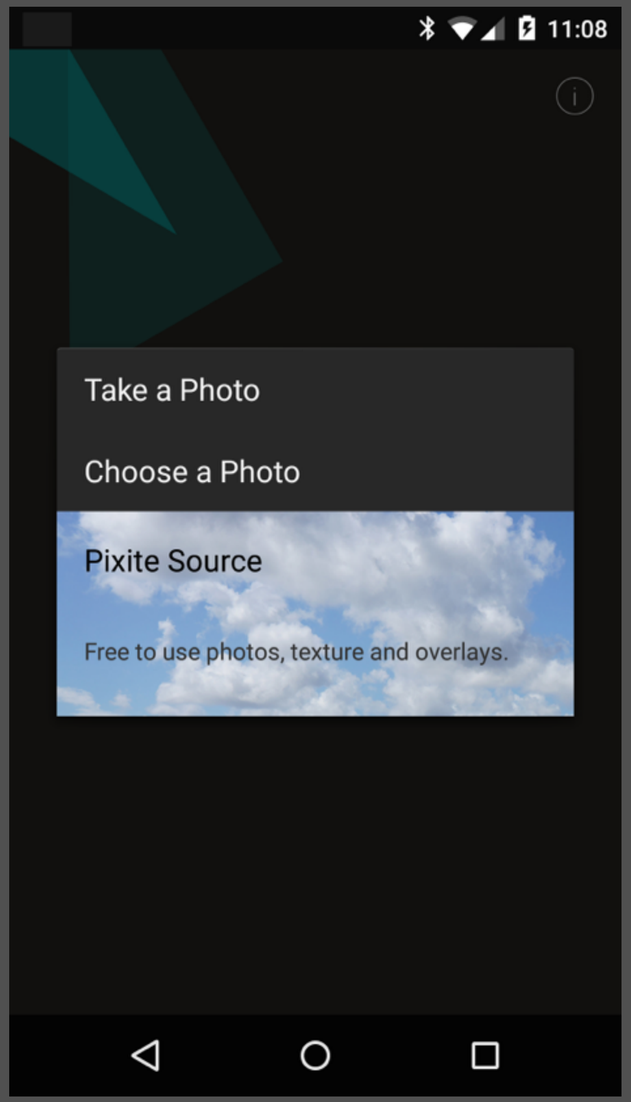


API Strategies - Hybrid



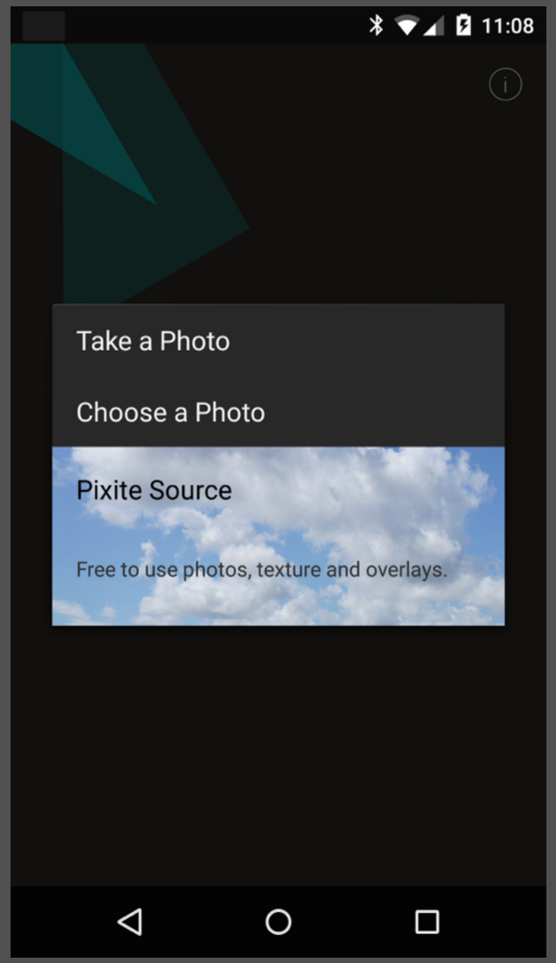
API Strategies - Hybrid

```
Intent i = new Intent(this, ImageChooserActivity.class);
startActivityForResult(i, REQUEST_CHOOSE_PHOTO);
```



Design a Good API

```
public interface ImageLoader {


}
```



Utility Library

UI Library

Distribution

- Open Source (jcenter, Maven Central)
- Private Maven Repo

Document and Communicate

Document and Communicate

- If a library is only used once, is it a library?
- Communicate outside of engineering
  - Sales needs to know what to sell
  - Design needs to know components and limitations
- Javadoc for Engineering, Wiki for others

Manage the Project

Manage the Project

- Treat internal libraries like a client project
- Dedicate resources
- Manage requests
- Define requirements
- Enforce versioned release cycle

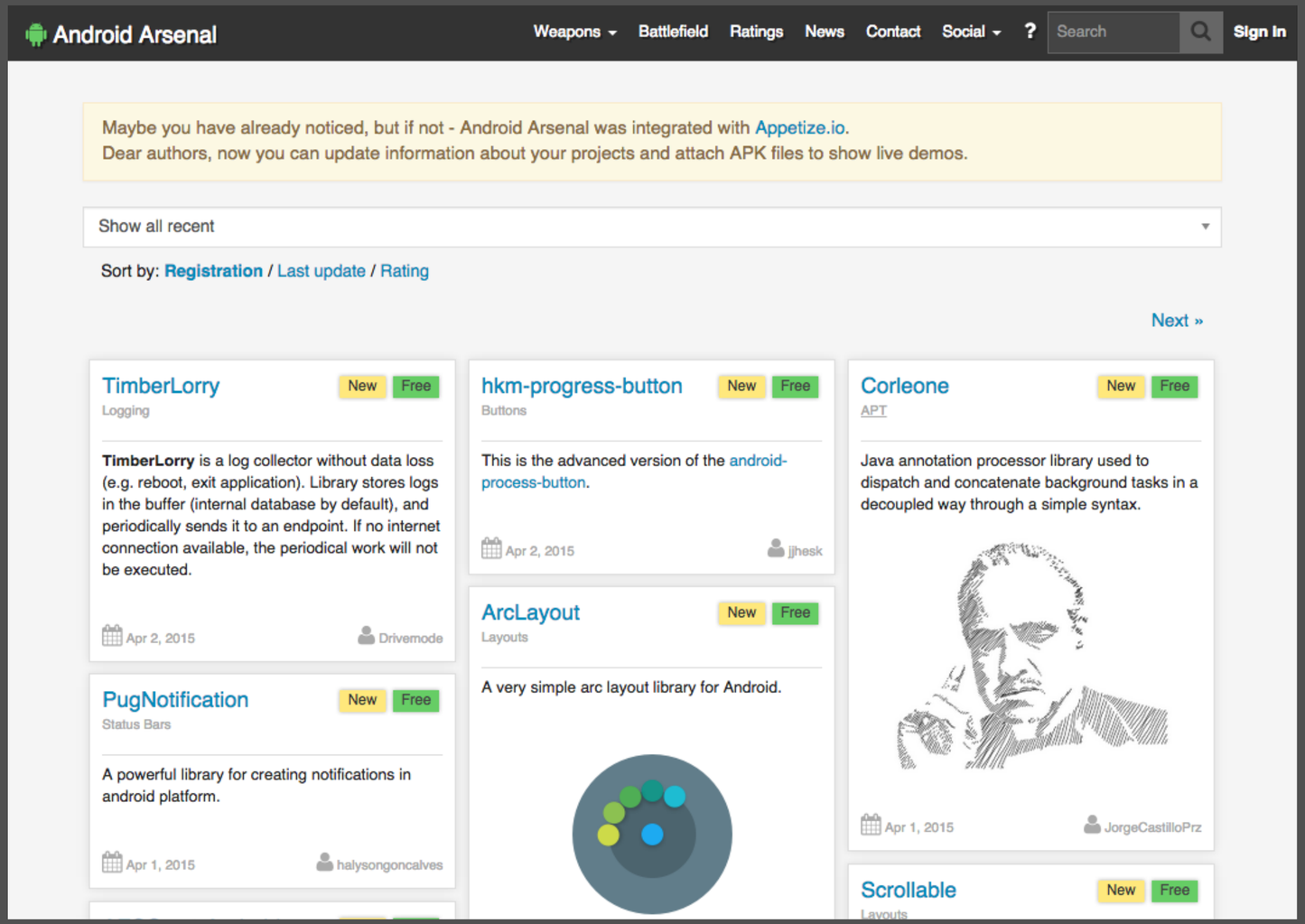
Reusable Libraries

Ryan Harter
@rharter
+RyanHarter

Good Open Source Libraries

Android Arsenal

https://android-arsenal.com



Retrofit

http://square.github.io/retrofit/

A type-safe REST client for Android and Java

```
public interface GithubService {

  List<Repo> listRepos(String user);
}
```

Retrofit

http://square.github.io/retrofit/

A type-safe REST client for Android and Java

```
public interface GithubService {
  @GET("/users/{user}/repos")
  List<Repo> listRepos(@Path("user") String user);
}
```

Retrofit

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A type-safe REST client for Android and Java

```
public interface GithubService {
  @GET("/users/{user}/repos")
  List<Repo> listRepos(@Path("user") String user);
}

RestAdapter restAdapter = new RestAdapter.Builder()
    .setEndpoint("https://api.github.com")
    .build();
```

Retrofit

http://square.github.io/retrofit/

A type-safe REST client for Android and Java

```
public interface GithubService {
  @GET("/users/{user}/repos")
  List<Repo> listRepos(@Path("user") String user);
}

RestAdapter restAdapter = new RestAdapter.Builder()
    .setEndpoint("https://api.github.com")
    .build();
GithubService service = restAdapter.create(GithubService.class);
```

Retrofit

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A type-safe REST client for Android and Java

```
public interface GithubService {
  @GET("/users/{user}/repos")
  List<Repo> listRepos(@Path("user") String user);
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    .build();
GithubService service = restAdapter.create(GithubService.class);

List<Repo> repos = service.listRepos("octocat");
```

Retrofit

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```
public interface GithubService {
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    .build();
GithubService service = restAdapter.create(GithubService.class);

List<Repo> repos = service.listRepos("octocat");
```

Picasso

http://square.github.io/picasso/

A powerful image downloading and caching library for Android

```
Picasso.with(context)
        .load("http://i.imgur.com/DvpvklR.png")
        .into(imageView);
```

Android Support

https://developer.android.com/tools/support-library/features.html

- AppCompat
  - ActionBar and friends
  - Material Themes
- CardView
- GridLayout
- MediaRouter
- Palette
- RecyclerView

Calligraphy

https://github.com/chrisjenx/Calligraphy

Custom fonts in Android an OK way.

Direct

```
<TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    app:fontPath="“fonts/Roboto-Bold.ttf”/>
```

Styles

```
<style name="AppTheme.Widget.TextView" parent="...">
    <item name="fontPath">fonts/Roboto-ThinItalic.ttf</item>
</style>
```

Butterknife

http://jakewharton.github.io/butterknife/

View "injection" library for Android

```
class ExampleActivity extends Activity {
  @InjectView(R.id.title) TextView title;
  @InjectView(R.id.subtitle) TextView subtitle;
  @InjectView(R.id.footer) TextView footer;

  @Override public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.simple_activity);
    ButterKnife.inject(this);
    // TODO Use "injected" views...
  }
}
```

Butterknife

http://jakewharton.github.io/butterknife/

View "injection" library for Android

```
class ExampleActivity extends Activity {
  @InjectView(R.id.title) TextView title;
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  @Override public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.simple_activity);
    ButterKnife.inject(this);
    // TODO Use "injected" views...
  }
}
```

Reusable Libraries

Ryan Harter
@rharter
+RyanHarter