Listify

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1. Overview

➢ 1.1 Problem

Oftentimes groups of people find themselves in disagreement over the prioritization or order of things. For example, it is often hard for a group of people to agree on the relative ordering of items. For example, simple questions such as "What are Kanye's albums listed from best to worst?", "Who are the top 5 players in the NBA?" or more useful application like, "Looking to buy some dresses for the Spring. Which look best on me?", and "What should our budget be used to buy this semester, from most necessary to least?," are difficult to come to a consensus on.

➢ 1.2 Our Solution

Listify seeks to mitigate this problem by providing a quick and simple experience for crowdsourcing opinions on questions of this type. Listify is an application that allows users to create and share lists for people to fill out by designating the items in the pool of objects that can be ranked and how many objects can be ranked. For example, if the user wants people to rank the top 5 NBA players of all time, he/she can create a list that allows 5 objects to be ranked, from a pool of 50 basketball players that he/she has chosen to be rankable. In addition to this, the user can also add additional items to his/her list following its creation.

Lists can be private or public depending on the creating user's preference. Once a list is created, the creating user can choose to share it with only a select group of other Listify users (private) or they can choose to share it with everyone else on Listify (public). Sharing the list with everyone else on Listify allows the list to be seen on the global Listify feed, wherein other Listify users can submit their ranking to a list along with a comment, as well as where they can downvote and upvote lists based on the quality of their content. Submission is done through an easy drag-and-drop user interface. Users can edit their submission to a particular ranking until it is closed by the creating user, at which point any users clicking on the ranking will see a final consensus on the ranking of the list created by a relatively simple aggregation algorithm. If users would like to search for lists that may not be floating to the top of the global feed, or if they want to see if a list already exists before submitting one, they can do so easily through a search feature.

We are hoping that by making Listify a rewarding, social, and very simple experience with a lot of useful properties it can become a popular tool. Typical polling and form apps with similar operational principles (even those on social networking sites like Facebook or Twitter) do not provide the ability to gauge relative likes/dislikes/priorities, and instead they focus on receiving a single answer instead, missing key information about how people make decisions. By capturing this relative-choice information in user responses, we hope to make this a more intuitive tool than we see in our current competition.

2. Concepts

- 2.1 List
  - Purpose: Allows users to create a tool for aggregating opinions, by designating the items in the pool of objects that can be ranked and how many objects can be ranked.
  - Operational Principle: Uses can create their own list from the main page of Listify, as well as most pages on the app by clicking a convenient red circled plus sign on the bottom right of their screen. Upon deciding to create a list, the user designates a title and a description for the list. They also add items to be ranked the list (see 2.3) and select the number of ranking slots the list allows for (which cannot be higher than the number of items in the list). To ensure that every list has at least one ranking, the creating user submits his own ranking to the list after creating it to finalize the submission of the list. Every list is automatically top to bottom, and will display a "Top {{ numberOfRankableSlots }}" text next to the title when other users see it (see 6.2.2). Once the user has decided that they feel comfortable publishing their list, they can choose whether to make it public or share it with on a select group of users which they can designate with an Invite (see 2.4). If the user wants to add more items to the pool of possible items before they have locked submissions, they can do so (however, they cannot delete items already in the pool). Once the user feels they have received a desirable number of ranking submissions (see 2.2), they can choose to lock the list, at which point no further modifications to the list can be made and no more rankings can be submitted. Any user that goes to the unique url associated with the list (by clicking on the list in the global feed or copying and pasting the url from elsewhere) will now see just the final consensus of the list and nothing else.
  - Misfits:
    - Avoids the issue of a user wanting to add more items to a list by allowing them to do so until the list has been locked.
    - Avoids the issue of constant modification to a list which could make invalid previous submissions by not allowing the creating user to delete items.
    - Avoids the issue of when to close a list for ranking submissions by allowing the creating user to make that choice.
    - Avoids the issue of possible confusions as to how a list is oriented (best to worst, top to bottom, etc.) by making all lists in the orientation of "top to bottom" or "most applicable to least applicable." This reduces confusion and minimizes errors caused by the creating user's possibly bad title and description. Any other types of errors stemming from these fields are handled by voting (see 2.5).

- 2.2. Ranking
    - Purpose: Allows a user to submit his/her choice of a ranking for a particular list.
    - Operational Principle: Users can start to submit a ranking for an unlocked list by clicking on it the list. They can then drag and drop the items in the list into the rankable slots, as well as leave a comment for the creator of the list to see. Comments are for the entire list, and do not get published publicly until the list is locked, however, the creator of the list can see them on a rolling basis, just in case he/she would like to modify the items in the list based on some of the suggestions in the comments. Once submitting users have completed their ranking order and comment if they choose to write one that they can click to submit the ranking and they will get to see the current consensus of the list with their submission accounted for on the screen (see 3.1). Lists can be found from the Listify homepage once a user logs in which shows them the Listify public feed of lists, or they can search Listify for lists of their choice to see if any of them are unlocked and are still taking rankings. Users can also modify their rankings and comment for any list up until it is locked, simply by clicking on the list again and clicking that they would like to modify their ranking from the current one.
    - Misfits:
        - Avoids the issue of the user wanting to give feedback on why they made the choices they made or what choices they felt were missing through the comment.
        - Avoids the issue of a user changing his mind or wanting to submit a modified ranking given that the creator of a list added new items to it by allowing modifications to a ranking up until the ranking is officially locked by the creating user.
        - Avoids the issue of user-friendliness by making it very game-like and intuitive as to how rankings are created with a nice drag-and-drop feature.

- 2.3 Item
  - Purpose: Allows users to add a rankable object to the pool of objects that can be ranked in their list. Encapsulates information about a rankable object by including a title, description, images, and links as needed.
  - Operational Principle: Users create items when they are creating a list. Users can add items by clicking on the 'add item' button in the list creation view. They can populate an item with a title, a description, an image and a hyperlink if they so choose. These choices allow for a wide range of things that can be ranked as well as for an interesting variety in list-types. Items can be edited/added/deleted at any time until the user decides to submit the list. If an item is created, it is added to the pool of items that can be ranked in their list (once again, unless otherwise deleted before list submission). Once a list is submitted, items cannot be deleted from the list by the creating user, however, additional items can be added to the list by clicking their ranking from their profile view of all of their rankings and choosing to add more items. Adding more items then happens in a similar fashion compared to adding them initially.
  - Misfits:
    - Avoids the issue of creating users wanting to rank many different kinds of items by allowing various types of input (text, hyperlinks, images, etc.).
    - Avoids the issue of creating users wanting to add more items that they may have forgotten to add when creating the list initially or that they were inspired to add as a result of comments they received from earlier ranking submitters.
    - Avoids the issue of creating users having the ability to delete items from a list and nullify the responses of earlier ranking submitters by not allowing them to delete existing items.

- 2.4 Invite
  - Purpose: Allows users to control who can access their list to submit rankings once it has been created.
  - Operational Principle: After a user has finished creating their list and hit submit, they will be prompted with a box dialogue asking them to assign an invite to their list. This invite can be of the types 'public' or 'private.' A public list will invite all Listify users to submit rankings to it as the list will be able to appear on the Listify public feed. The private list invite, on the other hand, gives the user the option to invite only a specific set of users to respond to the list. This allows the user to have control over who can access their rankings so that they can be sure of the pool of responses that they will be receiving. The invitation for private lists works through a convenient search bar feature in the

box dialogue that will allow users to search through all Listify users with autocomplete enabled and select which users they would like to be able to access their ranking.

- Misfits:
  - Avoids the issue of users having the ability to control if their list is public or private, and if it is private for them to control specifically who can see it.
  - Avoids the issue of respondents submitting multiple rankings because they must have Listify accounts to respond to a ranking and thus, only one response from one account will be recorded.

➢ 2.5 Vote

- Purpose: Allows users to quality control the lists that appear on Listify's public feed by upvoting/downvoting them.
- Operational Principle: On Listify's public feed lists will have two small arrows, one pointing up for 'upvote' and the other pointing downward for 'downvote.' Any users can click these arrows to vote on any or all of the lists that are public on listify. Users can vote once by clicking either arrow, clear their vote by re-clicking the arrow, or change their vote by clicking the opposite arrow. Users can change or clear their vote at any time. Based on upvotes, as well as a few more features that will be handled by a relatively simple trending algorithm (see 3.2), lists on the public feed will be filtered based on quality and time since posting.
- Misfits:
  - Avoids the issue of quality controlling lists. By allowing users themselves to quality control through upvotes and downvotes the community itself is responsible for controlling quality and can decide if some lists are not worth it and others are.
  - Avoids the issue of how to figure out which lists are trending and which are not by providing a reasonable metric for popularity through net votes.

3. Algorithms

- 3.1 Consensus
  - This algorithm is used to compute a single consensus based on many submitted rankings
  - General Procedure:
    - The index of an item in a ranking is the weight attributed to that item in that ranking
    - As an example, take a single object in the database
      1. For each item in the set of all items across all rankings, find the sum of its indices across all those rankings
      2. Map each sum to a dictionary, in the form dict[Item] = sum
      3. Sort the sums in increasing order
      4. This is the order of the general consensus
  - Edge Cases:
    - Ties
      1. Math.random (pseudorandom coin flip)
    - Completely opposite orderings
      1. Rely on the assumption that there are enough rankings submitted (and a very low probability of several perfectly opposing rankings in even pairs) to mitigate this effect
    - No responses
      1. User submits first ranking, and is responsible for sending out the invites

- 3.1 Trending Lists
  - This algorithm is used to determine the ordering of Lists displayed on our "Trending" page
  - General Procedure:
    - Order every List object in the database in decreasing order based on net upvotes x 1/timeSinceCreation
  - Edge Cases:
    - Many rankings with zero votes
      1. Order by date

        - Old rankings with many upvotes
            1. The older a List is, the less it's upvote value is weighted

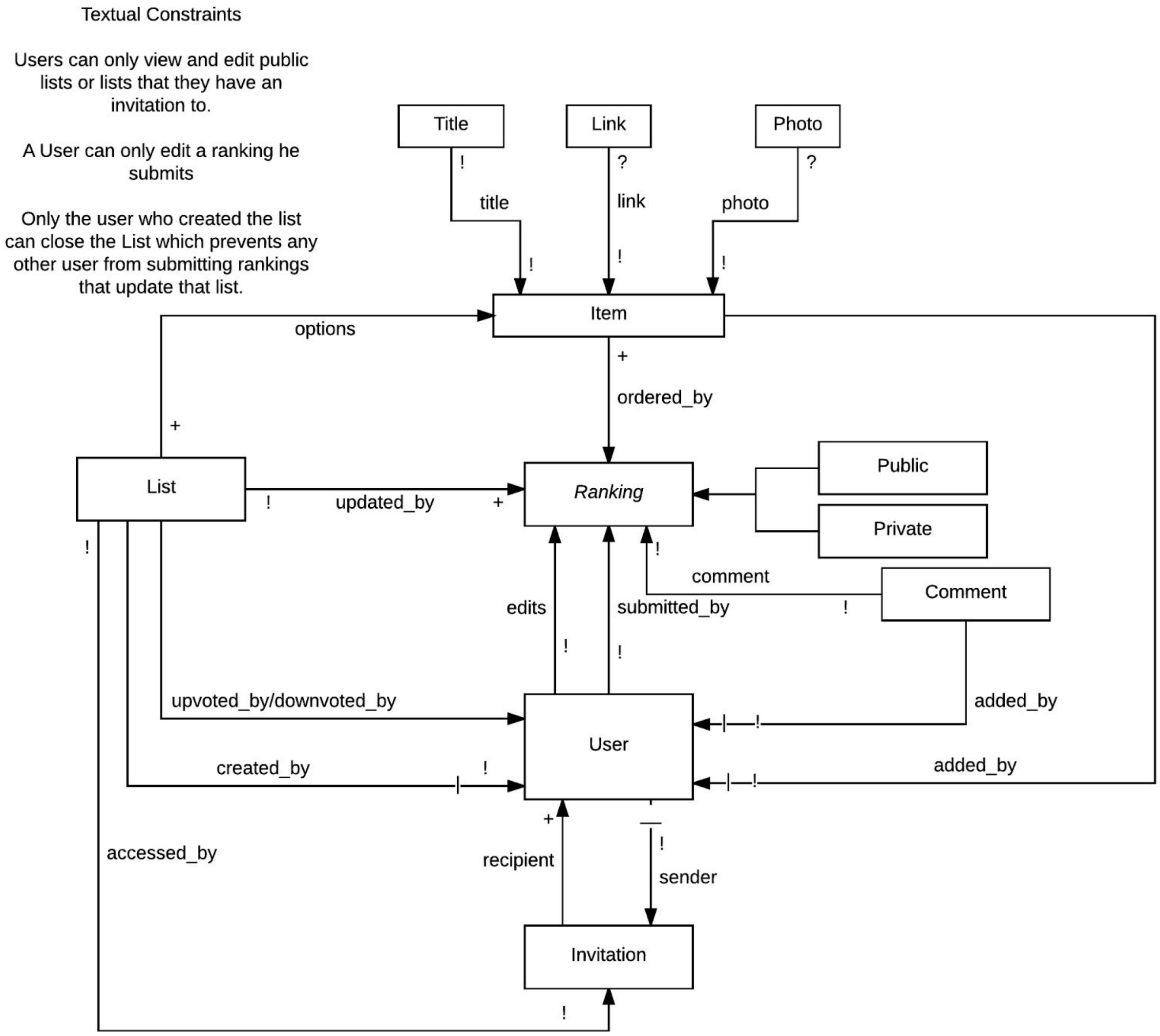
4. Search

- 4.1 Lists
    - Searching for lists through the Listify public feed.
    - Intended to allow users to search for public Lists that they find interesting and relevant
    - We plan to use a general string matching algorithm to find the most relevant Lists based on a text input

- 4.2 Users
    - Searching for users when inviting them to submit a Ranking to a List
        - Use the same simple string matching algorithm (on username strings) to find users
        - Simple autocomplete functionality (similar to selecting users to share with on Google Docs)
        - Iterates through our entire user database, it does not serve any purpose to limit the number of usernames a user can search for (we do not have a "friends" identifier or any concept of closeness between users).

5. Data Model and Insights

➢ 5.1 Model



Textual Constraints

Users can only view and edit public lists or lists that they have an invitation to.

A User can only edit a ranking he submits

Only the user who created the list can close the List which prevents any other user from submitting rankings that update that list.

➢ 5.2 Design Insights

- A List must be a separate object from a Ranking. A List stores the metadata required to aggregate the results of the poll. A Ranking represents a single ordering of items that gets submitted to a List. Mixing the two causes unnecessary complexity.
- Once a ranking is submitted, it must still be able to be edited
- Comments can only be submitted at the same time that a user submits a ranking

- It is a boost in complexity without added performance benefits to recompute rankings upon every submission, rather than storing a List object that has references to its many rankings. This design insight led us to create an actual List object in our model.
- You must have a Listify account (registered User) to submit a Ranking. This was a design decision that prevents repeated submissions and mitigates security concerns related to unwanted access to lists.

6 Security Concerns

- 6.1 Application Integrity
    - Data Storage:
        - No data is stored in the file system.
    - User Permissions:
        - Only the creating user is allowed to delete or lock a list.
        - Only the creating user is allowed to add items to a list. He/she is not allowed to delete items from a list. He/she is not allowed to change the title or description of the list.
        - Only the creating user is allowed to see comments associated with a list until it is locked.
        - Each user is allowed to submit one vote (upvote, downvote or no vote) per list.
    - List Permissions:
        - Private lists must remain private.
            - If a user wishes to create a private List, he will have the option to select which users (from a list of all Listify users) will be able to see the list and submit a ranking to it. Users must be authenticated before they can view a list or submit a ranking.
        - Users who are submitting rankings should only be able to submit one response per list, but are allowed to edit their response at any point until the creating user locks it.
        - Once a list is uploaded to the Listify's public feed, all data from users who submitted rankings is aggregated, and can't be linked back to any specific users.

- 6.2 Web Attack Mitigation
    - XSS
        - Listify is built on React.js which does not generate HTML strings, so Listify is protected from XSS by default.
    - CSRF

        - To protect Listify from CSRF attacks, we will use a library like OWASP CSRFGuard which uses token injection to differentiate between legal and forged requests.
    - Database Injections
        - To protect from database injections, we will validate all inputs.
- 6.3 Threat Model
    - Attacker Capabilities:
        - Listify assumes that the attacker has all of the capabilities of a normal user. When evaluating packet sniffing, we assume the user may have the ability to sniff packets within reasonable capabilities.
        - In especially malicious cases, such as when evaluating the possibility of DDoS attacks, we may also assume that the attacker has access to a significantly sized botnet.
    - Packet Sniffing:
        - To prevent packet sniffing Listify uses HTTPS 2.x everywhere. Listify will also be deployed over Heroku which will have an SSL/TLS layer to protect against this.
    - DDoS:
        - Listify does not plan to use a service like Cloudflare to protect against DDoS attacks

7 User-Interface Wireframes

Figure 1: Creating a List (empty).

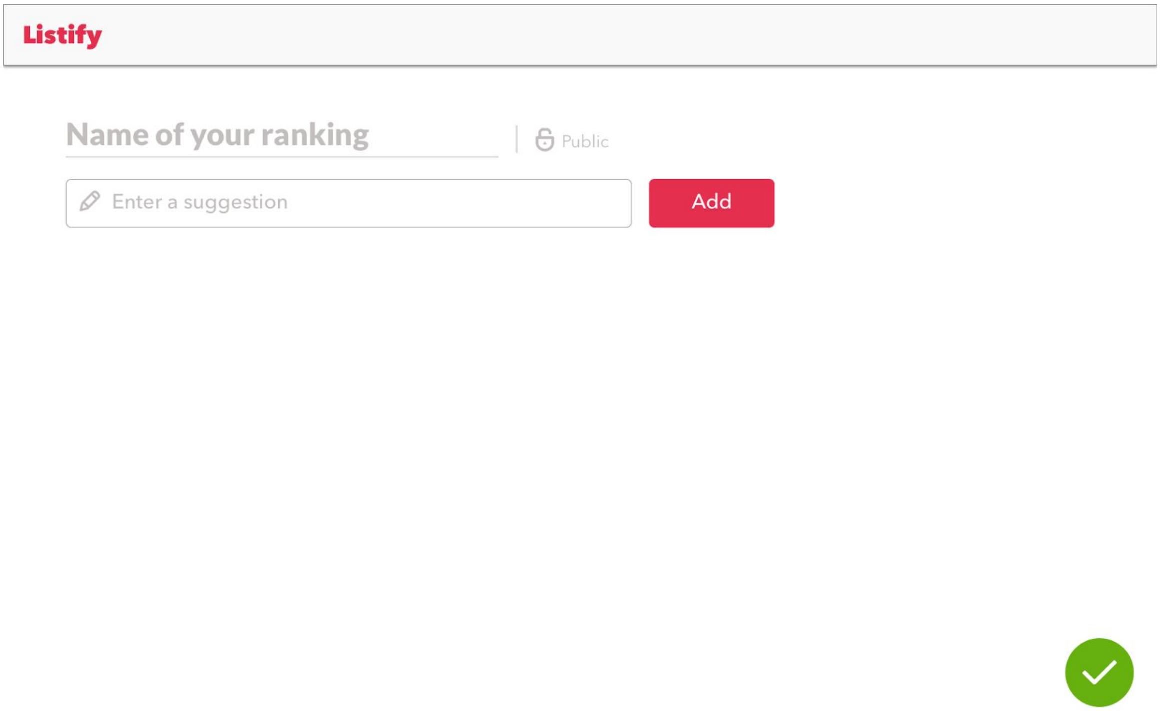
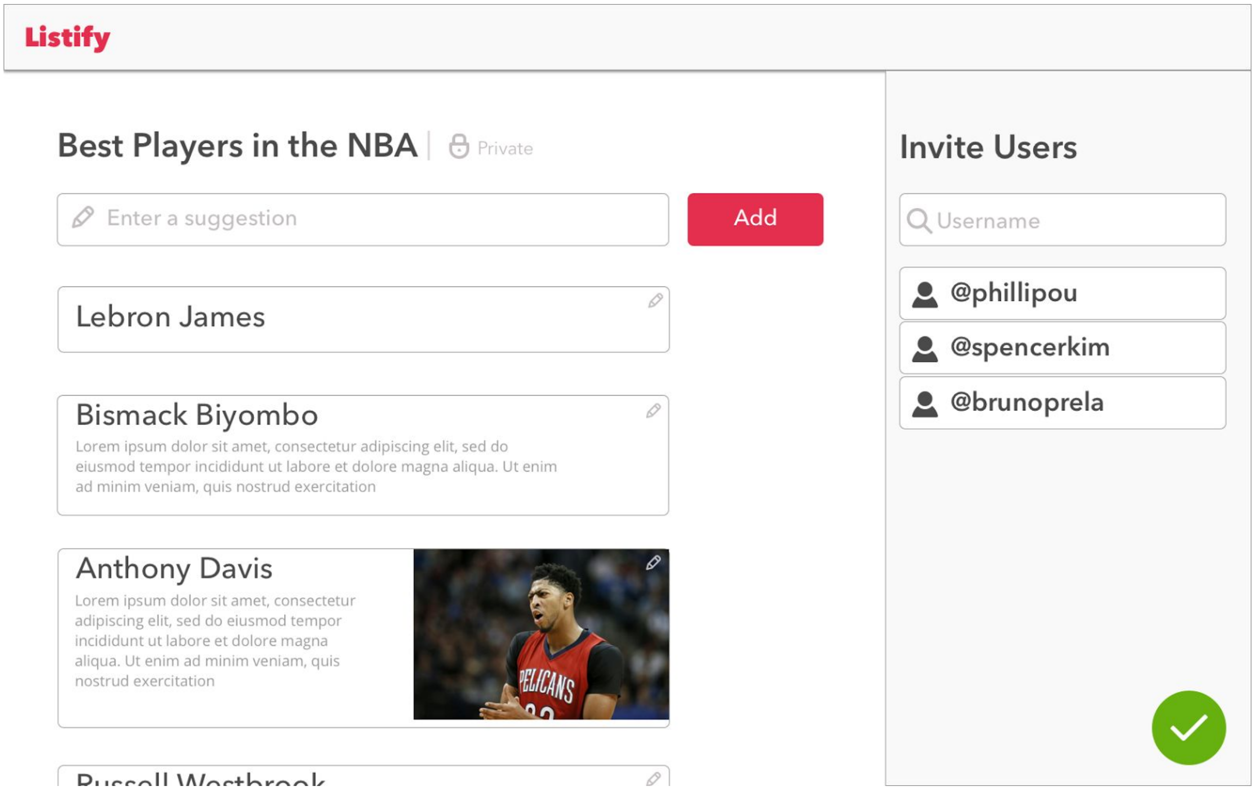


Figure 2: Creating a List (in progress).



Best Players in the NBA | Private

Lebron James

Bismack Biyombo

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Anthony Davis

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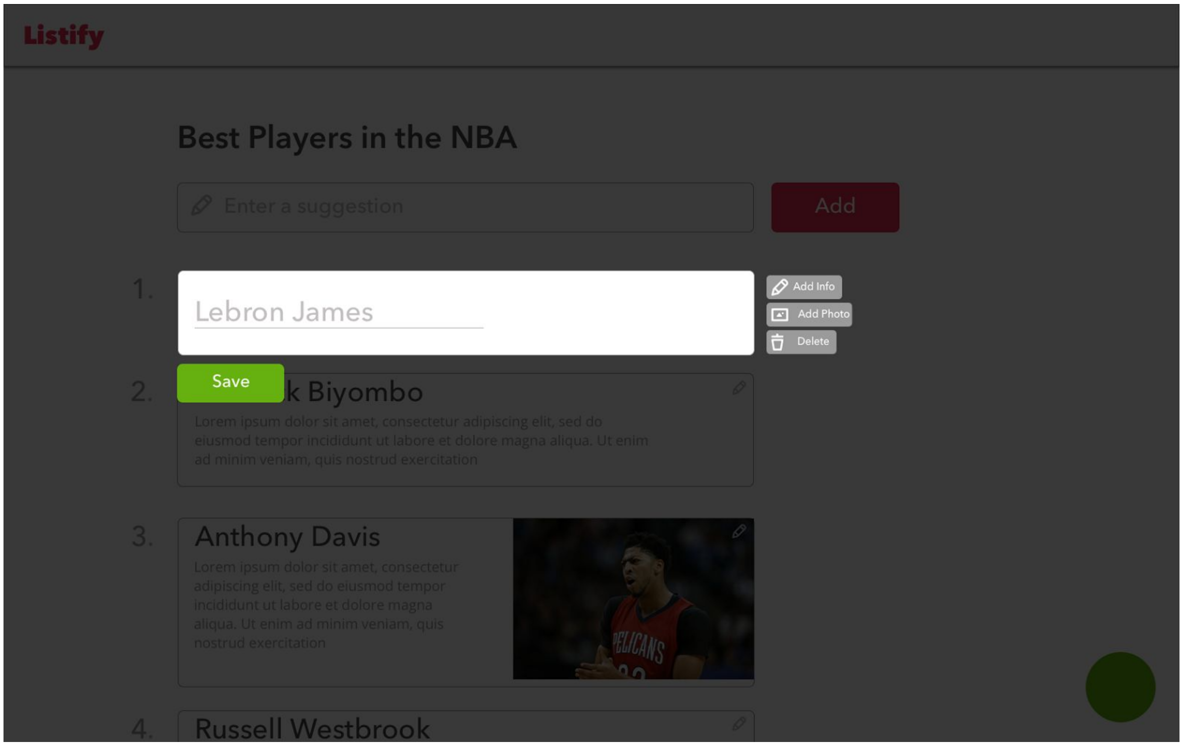
Russell Westbrook

@phillipou

@spencerkim

@brunoprela

Figure 3: Editing an Item on a List.



Listify

Best Players in the NBA

Enter a suggestion

Add

1. Lebron James

Save

Add Info

Add Photo

Delete

2. k Biyombo

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3. Anthony Davis

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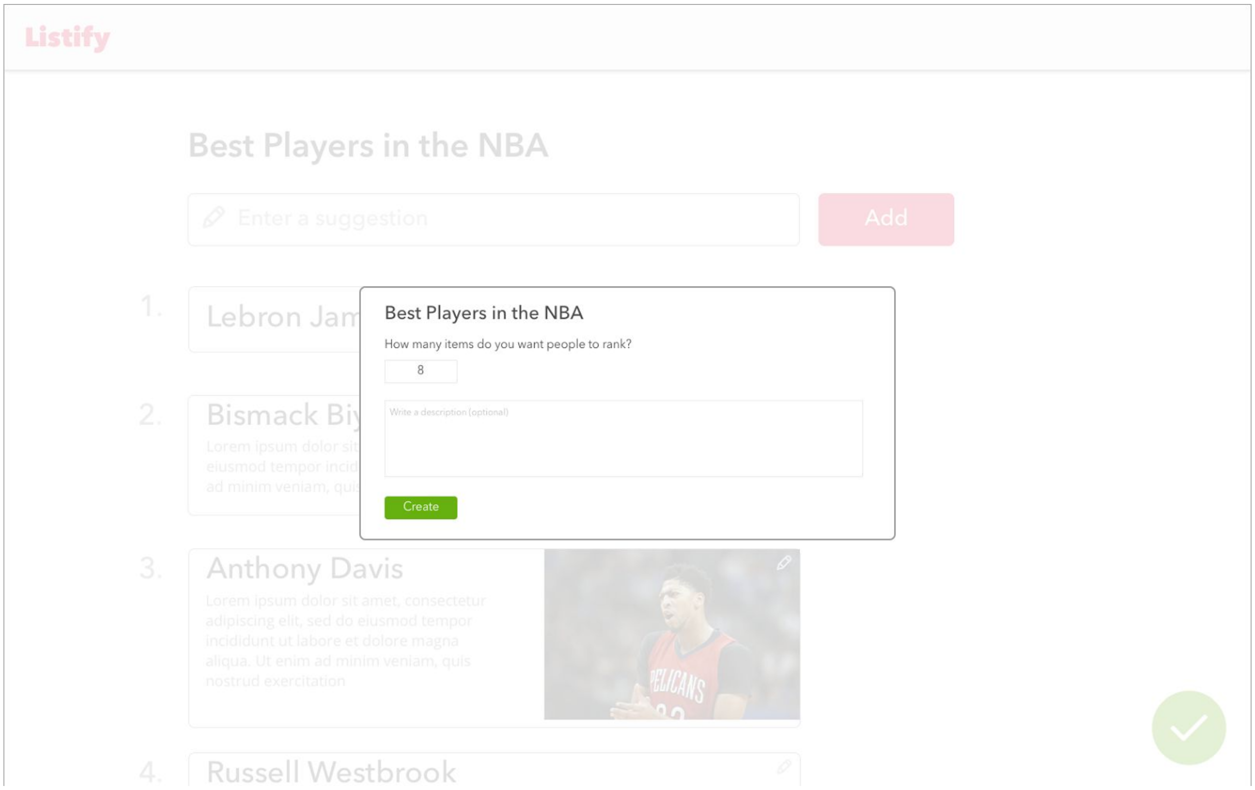
4. Russell Westbrook

Figure 4: Set Capacity for a List (Dialog appears after clicking on green checkmark).



Listify

Best Players in the NBA

Enter a suggestion

Add

1. Lebron Jam

2. Bismack Bi

Lorem ipsum dolor sit eiusmod tempor incid ad minim veniam, qui

Best Players in the NBA

How many items do you want people to rank?

8

Write a description (optional)

Create

3. Anthony Davis

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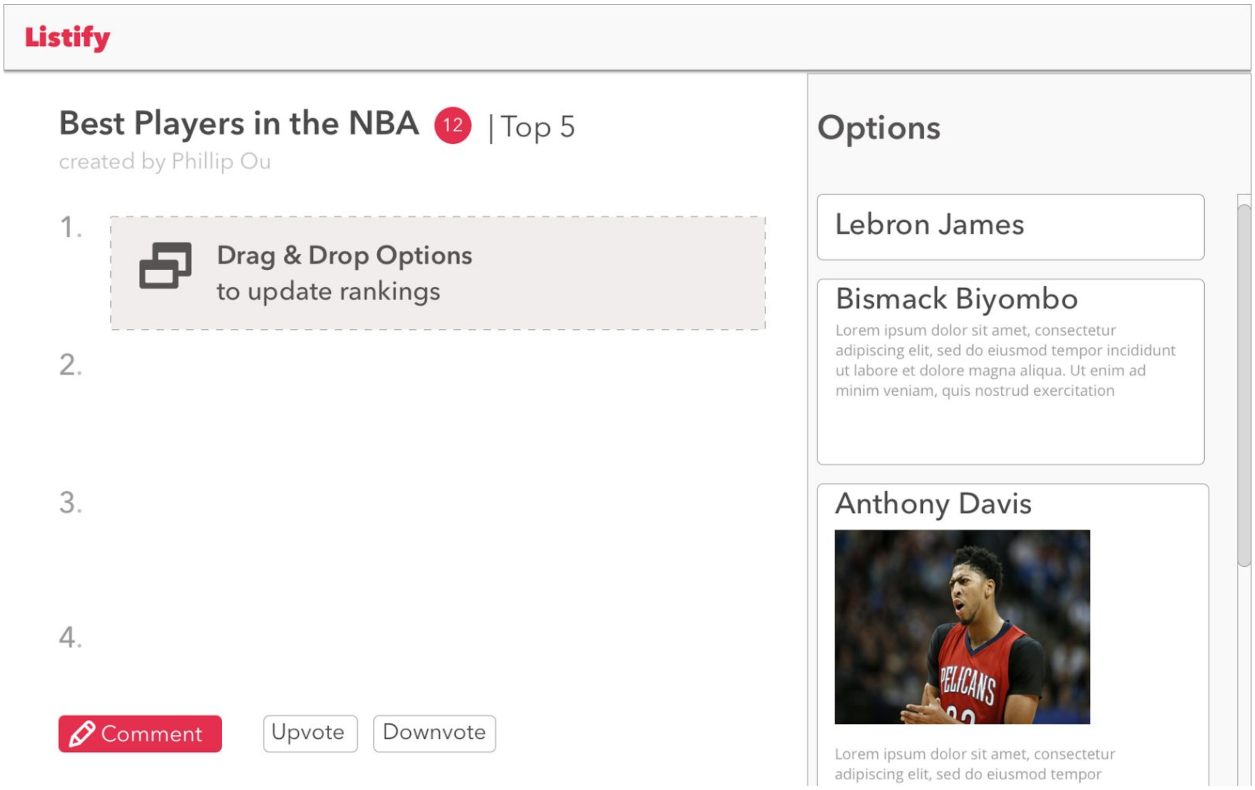
4. Russell Westbrook

Figure 5: Editing a ranking (with commenting, upvoting, and downvoting).



Best Players in the NBA 12 | Top 5

created by Phillip Ou

1. Drag & Drop Options to update rankings

2.

3.

4.

Lebron James

Bismack Biyombo

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Anthony Davis

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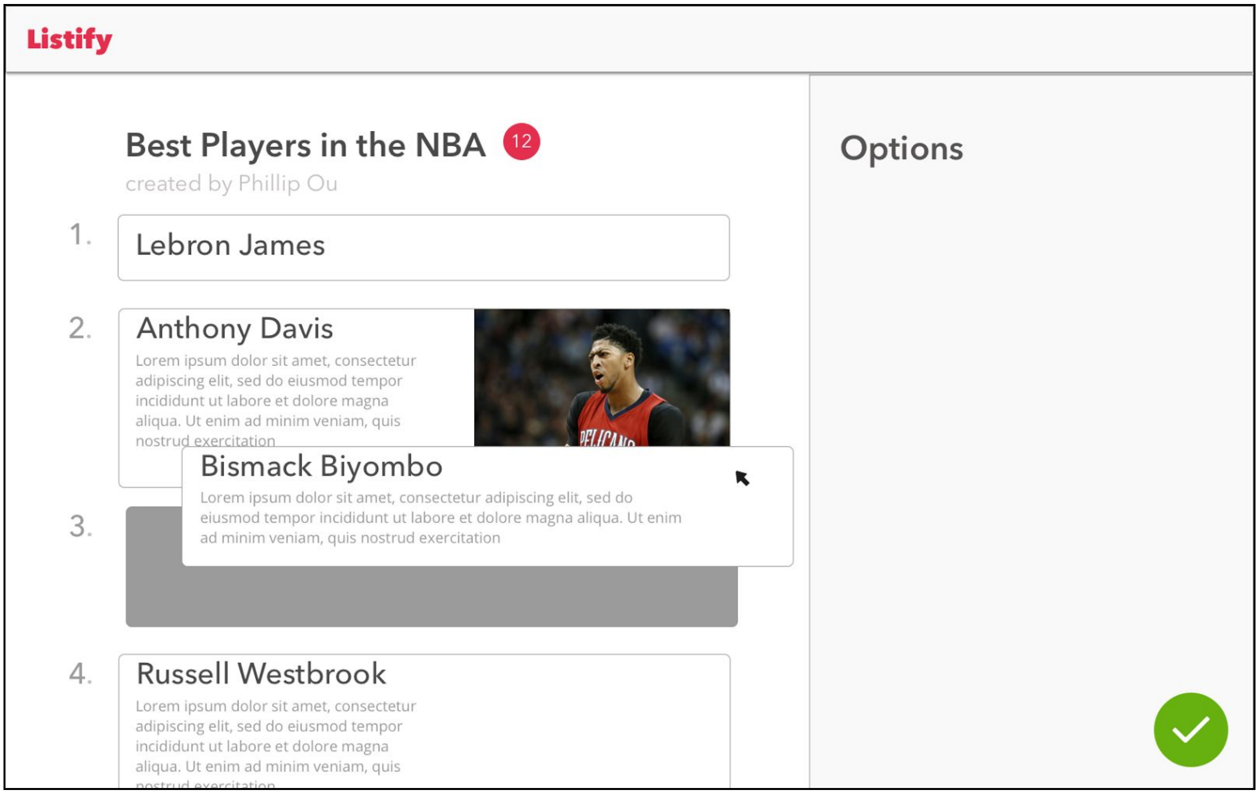
Figure 6: Rearranging Items.



Best Players in the NBA 12

created by Phillip Ou

1. Lebron James

2. Anthony Davis

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Bismack Biyombo

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4. Russell Westbrook

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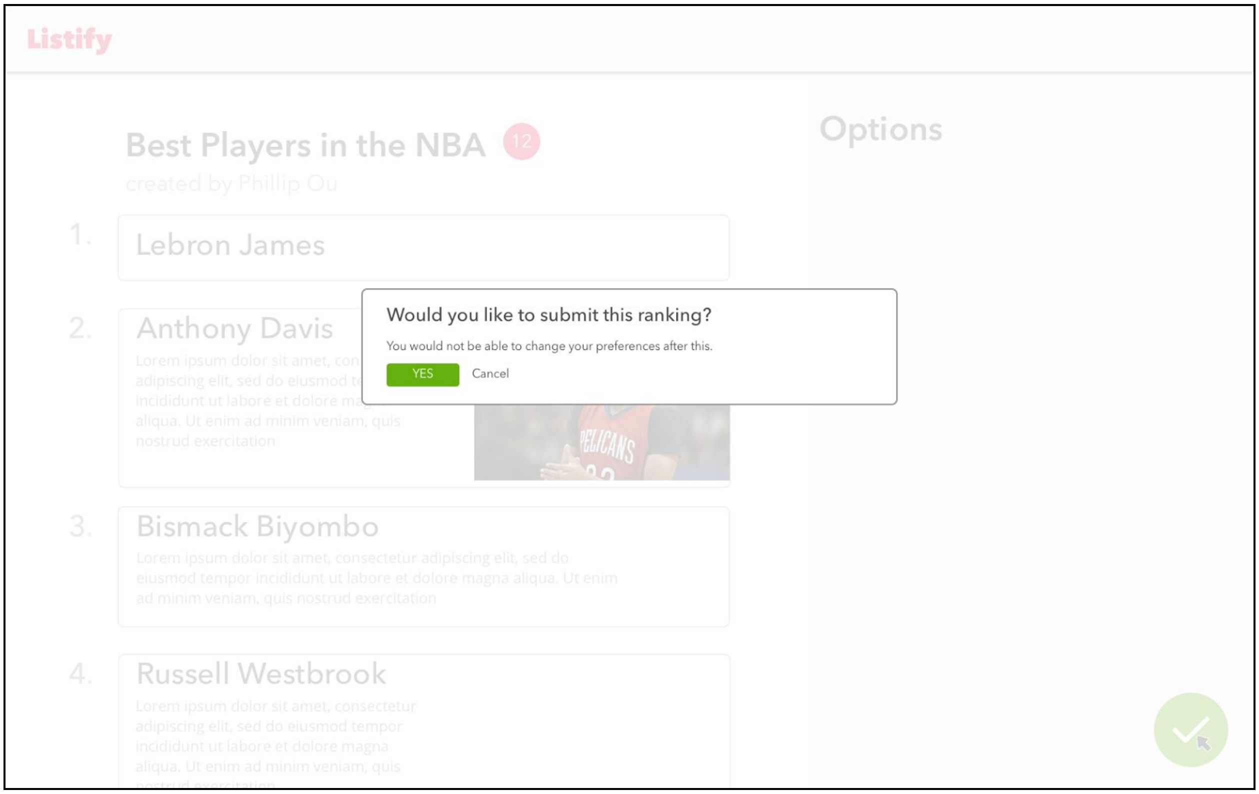
Figure 7: Submitting a List (Dialog appears after clicking on green checkmark).



Would you like to submit this ranking?

You would not be able to change your preferences after this.

YES Cancel

Listify
Best Players in the NBA
12
created by Phillip Ou
Options
1.
Lebron James
2.
Anthony Davis
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3.
Bismack Biyombo
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4.
Russell Westbrook
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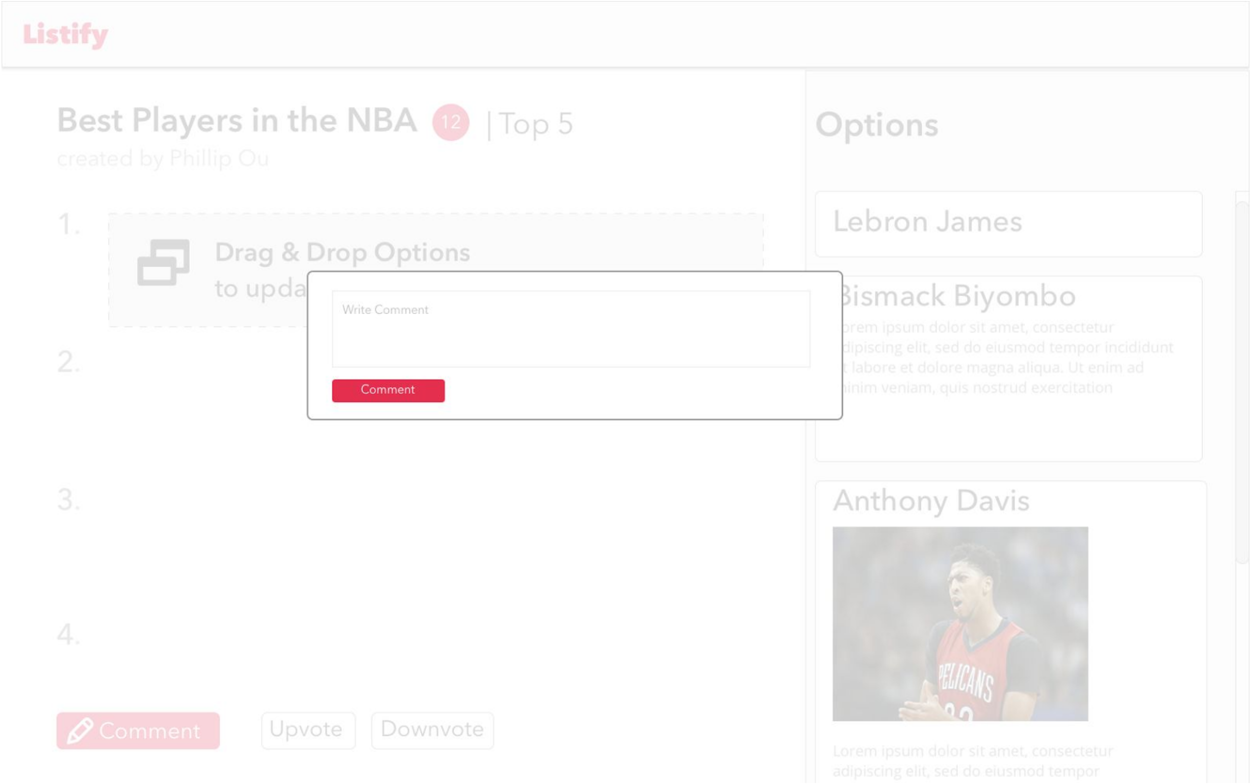
Figure 8: Writing a comment.



Write Comment

Comment

Listify
Best Players in the NBA
12
| Top 5
created by Phillip Ou
Options
1.
Drag & Drop Options
to upda
2.
3.
4.
Comment
Upvote
Downvote
Lebron James
Bismack Biyombo
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Anthony Davis
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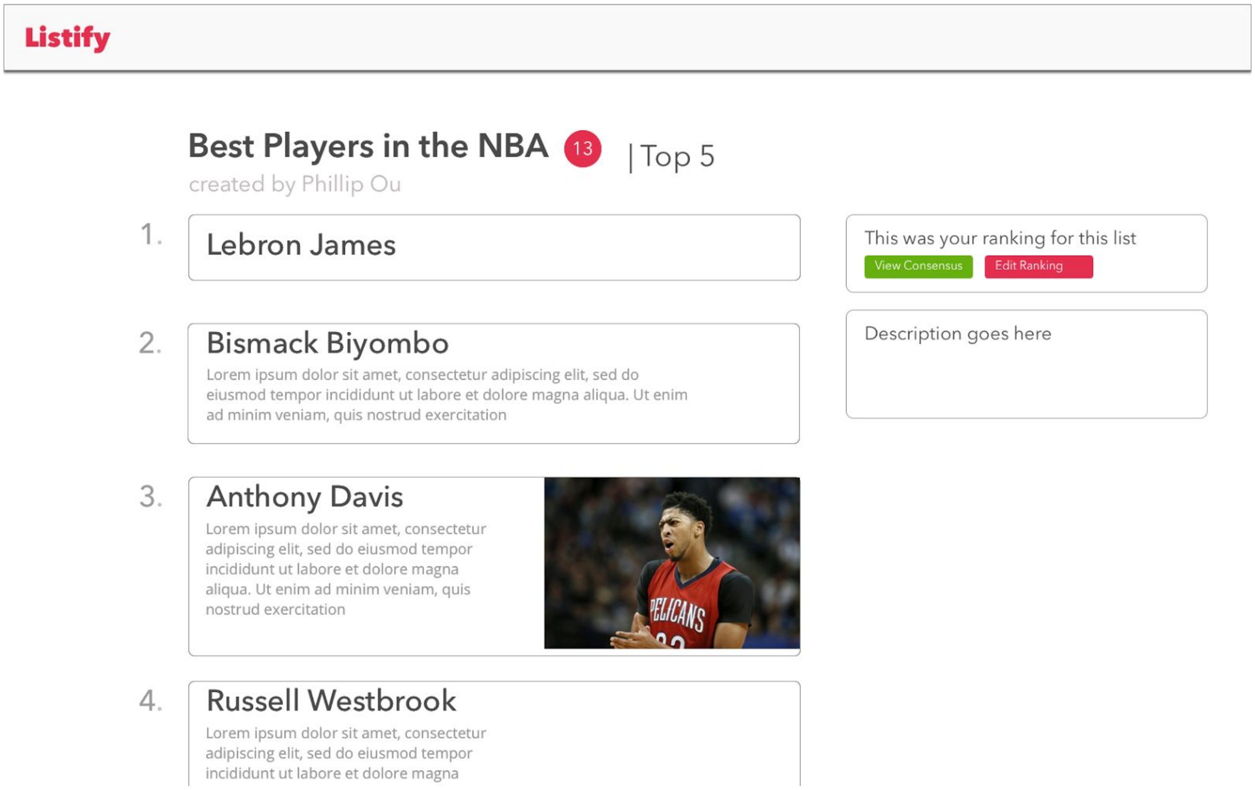
Figure 9: Viewing a ranking.



Best Players in the NBA | Top 5

created by Phillip Ou

1. Lebron James

2. Bismack Biyombo

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3. Anthony Davis

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4. Russell Westbrook

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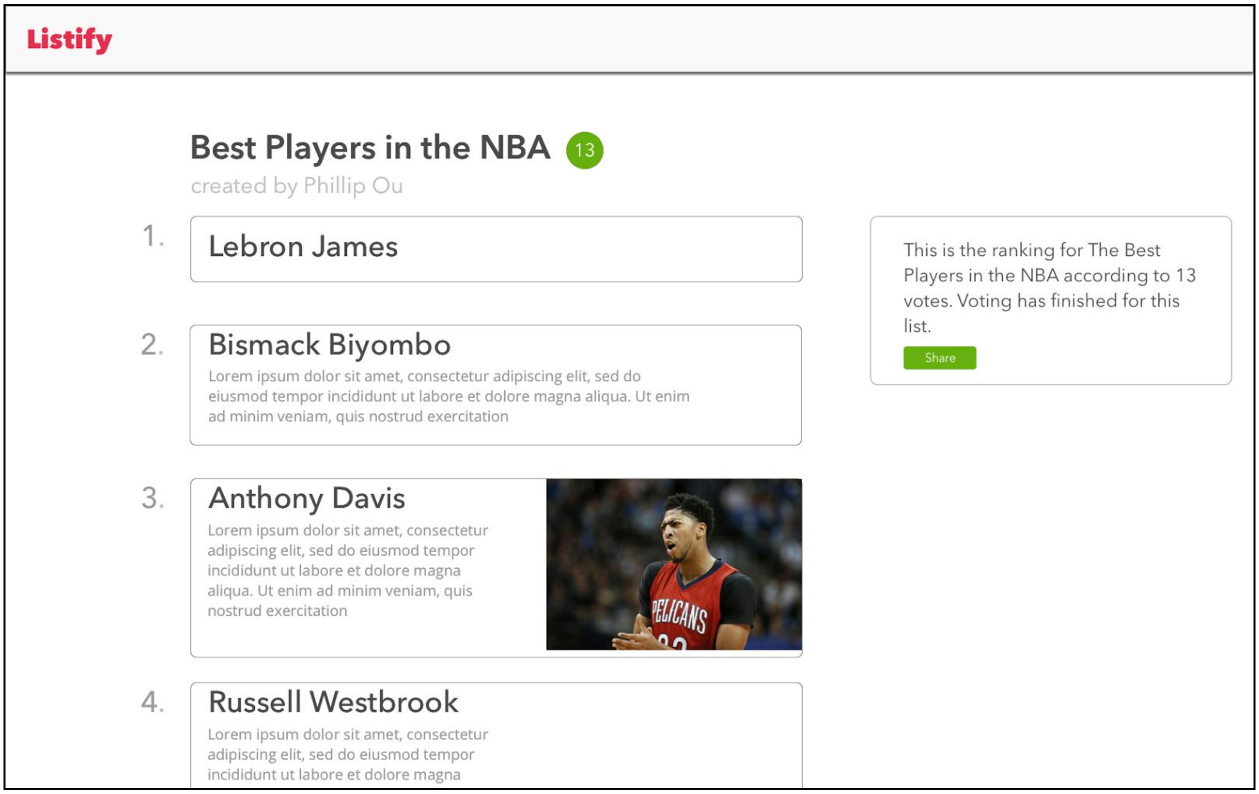
This was your ranking for this list

Description goes here

Figure 10: Seeing Consensus Ranking (Seen after submitting your own ranking).



Best Players in the NBA

created by Phillip Ou

1. Lebron James

2. Bismack Biyombo

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3. Anthony Davis

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4. Russell Westbrook

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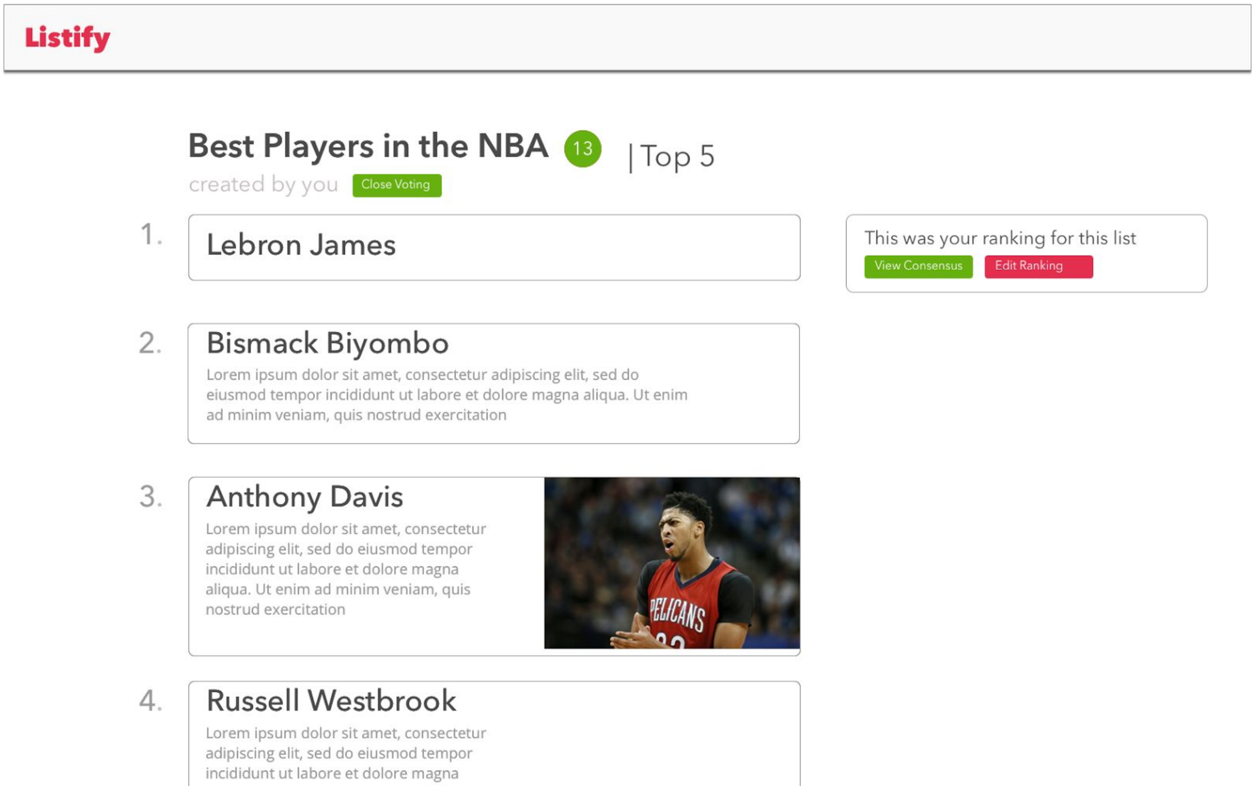
This is the ranking for The Best Players in the NBA according to 13 votes. Voting has finished for this list.

Figure 11: Viewing a List you've Edited (Close voting button only appears if you're the creator of the list. Closing Voting prohibits anyone else from submitting or editing rankings).



Listify

Best Players in the NBA 13 | Top 5

created by you

1. Lebron James

2. Bismack Biyombo
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3. Anthony Davis
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4. Russell Westbrook
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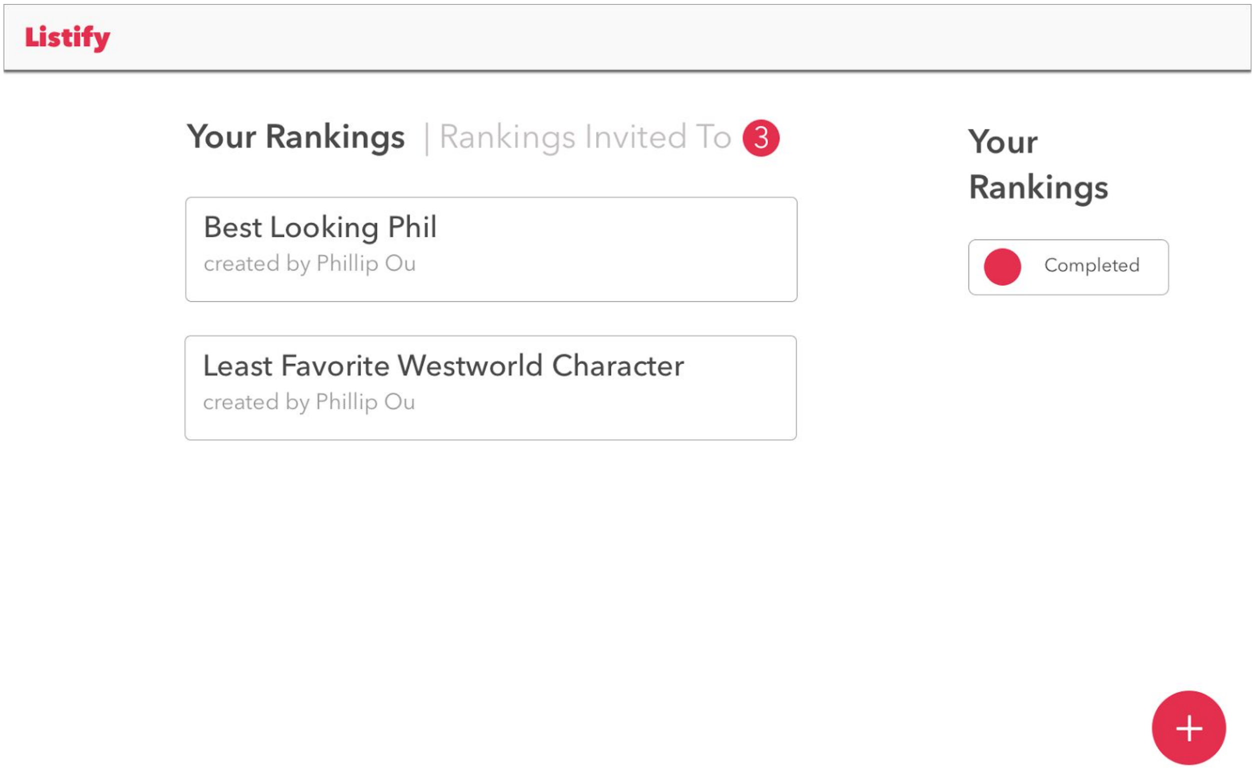
This was your ranking for this list

Figure 12: User Profile.



Listify

Your Rankings | Rankings Invited To 3

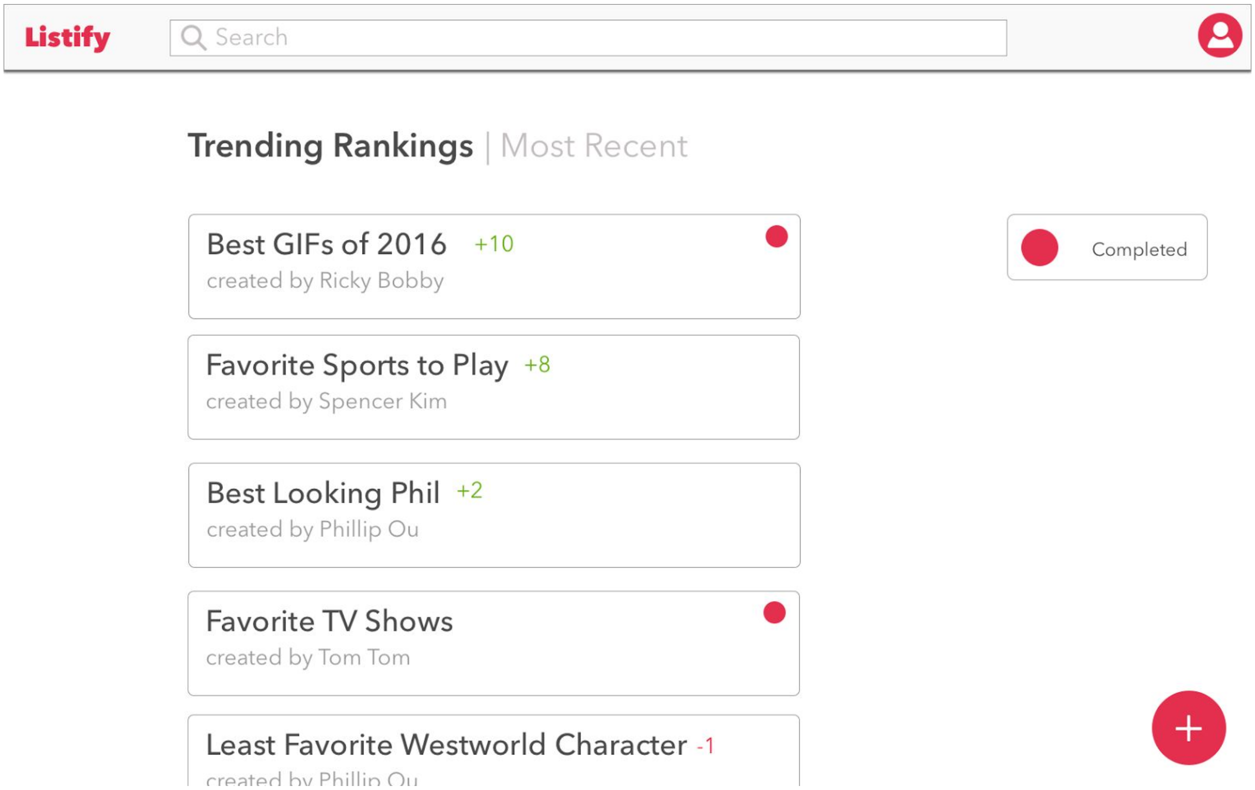
Best Looking Phil
created by Phillip Ou

Least Favorite Westworld Character
created by Phillip Ou

Your Rankings

● Completed

Figure 13: Trending rankings.



Trending Rankings | Most Recent

Best GIFs of 2016 +10 ●
created by Ricky Bobby

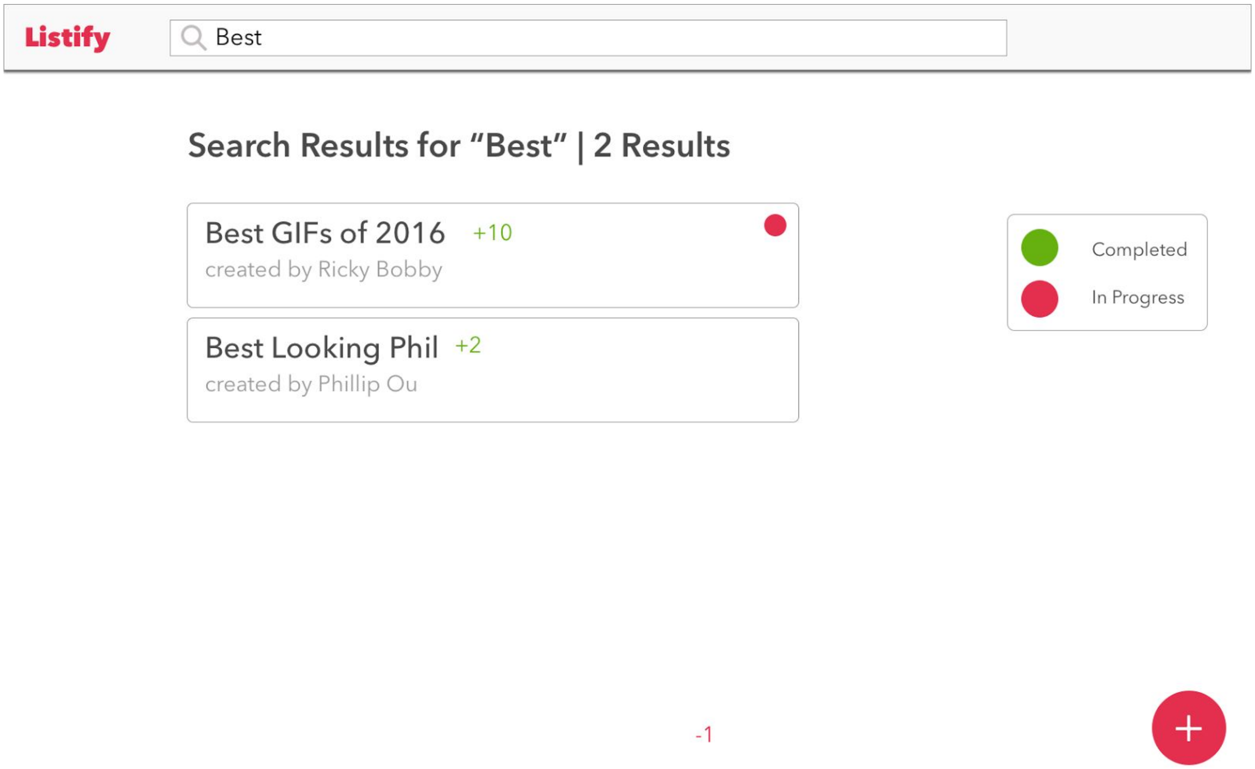
Favorite Sports to Play +8
created by Spencer Kim

Best Looking Phil +2
created by Phillip Ou

Favorite TV Shows ●
created by Tom Tom

Least Favorite Westworld Character -1
created by Phillip Ou

Figure 14: Searching for rankings.



Search Results for “Best” | 2 Results

Best GIFs of 2016 +10 ●
created by Ricky Bobby

Best Looking Phil +2
created by Phillip Ou

8 Challenges

8.1 Design Risks

- ➢ Users may create multiple accounts to upvote their own rankings or downvote others' rankings
    - This is only an issue for public Lists, which are accessible by every Listify user
    - This is a currently unsolved social media problem that we don't plan to solve. If a user wants to create many Listify accounts to vote on their public Lists, we don't plan on stopping them.
- ➢ Creators may put invalid/inappropriate items into the list's pool of options
    - Creators are free to build the pool of items however they wish. If a list gets published with inappropriate items, our application allows users to downvote content, so these lists would ideally be filtered out. We will also consider allowing users to flag lists they believe are inappropriate.
- ➢ How to differentiate between Best to Worst vs. Worst to Best lists
    - See the Operational Principle in 2.1. Each List will be published with a | Top X next to it's title. So, for example, if a user creates a List called Best NBA Players, Listify will display it to users as "Best NBA Players | Top 5". This is designed to indicate to the user that the first slot is the most applicable, and the last slot is the least applicable.

8.2 Design Choices

- 8.2.1 Problems to resolve in Concepts
  - Problem: How to determine who has access to a ranking (and how to give them access)?
    - Options available:
      1. Private Lists are distributed to selected users with Listify accounts
      2. Private Lists are distributed via a single URL unique to that list that can be submitted by any anonymous user with the link
      3. Every list is public and accessible to anybody with a Listify account
    - Evaluation:
      1. Option 1 is a sensible, simple way to approach this problem, but may limit user input
      2. Option 2 is an interesting feature, but adds unnecessary complexity and adds security concerns (submitting twice, leaking the link to unwanted users)
      3. Option 3 has many security concerns, and limits the usability of the app for small, hand-curated groups
    - Which chosen and why?
      1. We chose option 1
      2. Limits complexity, safe and secure

  - Problem: When does a List close?
    - Options available:
      1. manually closed by the creator
      2. expires after a predetermined time interval
    - Evaluation:
      1. Google Forms require users to write a Google Script to schedule an expiration time/date for the form. Listify will allow users to easily set an expiration time for the ranking. We view this as a useful and much needed improvement on existing solutions.
      2. Expiring after a time interval is risky. Perhaps a List receives no input and the user cannot extend the time.
    - Which chosen and why?
      1. We plan to implement both features. A list creator can manually close a ranking at any time, or he/she can assign an expiration to the ranking which closes it after the time expires.

- Problem: What if a user does not have an account?
    - Options available:
        1. Force users to create an account before accessing a ranking
        2. Allow anonymous users to submit rankings, but don't give them access to the application
        3. Allow anonymous users to submit rankings and access the application
    - Evaluation:
        1. Forcing all users to create Listify accounts simplifies the design significantly
    - Which chosen and why?
        1. We will force all users to have Listify accounts for simplicity

➢ 8.2.2 Problems to resolve in User Interface

- Problem: What is the best way for the user to input his/her preferences?
    - Options available:
        1. Drag and Drop
        2. Click from dropdown list of options for each slot
        3. Typing items into the ranking slots
    - Evaluation:
        1. Typing and clicking from dropdown list of options may be valid ways for getting user input, however, they may not be as intuitive and easy to learn as drag and drop. People will not respond if a ranking is time-consuming to fill out. Also, "gamifying" ranking with drag and drop can make it more appealing for users to actually respond to rankings.
    - Which chosen and why?
        1. Listify allows users to drag and drop items from the pool of options. Allowing users to type answers into the ranking slots would require a significantly more difficult implementation that would need to constrain the user to the predetermined pool of options. Choosing from a dropdown is not a scalable option for large pools of options such as potential the massive list of potential NBA players for the ranking of the "Top 5 NBA Players of All Time".

- Problem: How does a ranking convey whether it is in most applicable to least applicable order, or vice versa?
    - Options available:
        1. We've solved this problem by organizing each List as most applicable to least applicable
    - Evaluation:

        1. Allowing the creating user to simply write their own prompt at the top of the list may result in a lot of confusion amongst respondents if the creating user is not explicitly clear. That’s why we’ll display every List as “Title | Top X”. See the Operational Principle of 2.1.
    - Which chosen and why?
        1. We chose to force each List to be ordered most to least applicable for simplicity. This solution is also very learnable for users who create Lists.