IntelliStream Information Item

SoundCloud

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Spring 2019

IntelliStream

Introduction

Information Item Introduction

This document contains the specifications of SoundCloud's IntelliStream product that will act as an addition to the SoundCloud's already existing platform. This product will be a feature that servers as a music curation system. This document serves as the standard as to which the IntelliStream product must adhere to.

IntelliStream

ConOps

B.2 Concept of operations document

B.2.1 Purpose

One of the world's largest music and audio platform, SoundCloud is seeking software that will allow users to search a song, an artist's name, or other relevant search terms and listen to a variety of music without needing to interact any further with the platform. IntelliStream will fulfill this need. IntelliStream will create a dynamic auto-recommendation system where users input minimal information and receive highly personalized temporary playlists to satisfy their listening needs.

B.2.2 Scope

Music streaming

IntelliStream is intended to work with music streaming platform SoundCloud.

AI

IntelliStream creates a system that learns its user's music preference and provides the user with song recommendations.

B.2.3 Strategic plan

IntelliStream's main improvable component for future implementation would be a better recommendation system, which would be implemented behind the scenes, leaving the present user interface the same. The recommendation system changes would deal with the machine learning algorithm behind the recommendation process.

B.2.4 Effectiveness

There aren't alternative implementations of this plan that would give better results, as the system at hand is simply a user interface to a machine learning algorithm.

B.2.5 Overall operation

B.2.5.1 Context

SoundCloud is the largest concentrated music streaming platform for new artist to publish music. As a result, the variety of music on the platform far outweighs its competition, like Spotify. IntelliStream will provide a machine learning system that is able to accurately recommend a song that customer would like to hear. This function will be added to the SoundCloud premium membership accounts. This will persuade customers to pay for premium membership. Advertisements alerting free users of the new auto recommendation feature will be played over commercials in the SoundCloud app. The goal of the IntelliStream song recommendation service is to produce more premium memberships by enticing them with this new feature. Because of SoundCloud's large selection of music, customers will have access to music not available by the competition, thus providing a more diverse discovery experience than other platforms.

B.2.5.2 Systems

SoundCloud database

To retrieve listening metrics on music across the SoundCloud platform and maintain a customer's preference of songs.

Machine learning function

Used for curating user music based on their listening habits.

B.2.5.3 Organizational unit

Managers will work with the development team. There will be a marketing team that will develop advertisements that will be given via commercials on the SoundCloud app. The advertisement will be aimed at free SoundCloud accounts to try and persuade the listener switch to a premium account. There will be a development team in charge of managing SoundCloud's database

system, ensuring a reliable connection. There will be a machine learning team that helps to maintain the music recommendation system.

B.2.6 Governance

B.2.6.1 Governance policies

Business and technological decisions will be decided by the board of directors and other executives (executive group) at SoundCloud with input from stakeholders of the project. Points of concern and interest will be raised throughout development, and the decisions will be made by the executive group.

B.2.6.2 Organization

There are 4 key units in the system responsible for the development of IntelliStream. The board members/executives (executive group), the development managers, and the development team. Other units, like other software development teams at SoundCloud, can be integrated into the development of IntelliStream. Human resources and other such units at SoundCloud will be shared with the development team for IntelliStream.

B.2.6.3 Investment plan

Investments in the IntelliStream product will be processed then analyzed by the managers of the product in order to allocate assets into the right areas for the betterment of this product.

B.2.6.4 Information asset management

According to the SoundCloud information policies that music listeners adhere to, the information used by the developers of IntelliStream will be confidential and provide no personal information in the recommendation process and for other analytical purposes. This system will only rely on objective listening metrics.

B.2.6.5 Security

Security in the development environment will be upheld by the facility's staff. Information security will be managed by the Information Technology personnel at SoundCloud.

B.2.6.6 Business continuity plan

Business continuity at SoundCloud during the development and shipment of this product will not be disturbed, as the system uses data already stored by SoundCloud. The product will use some computational power in order to produce a good recommendation, but this will in no way affect the operations going on at SoundCloud presently.

B.2.6.7 Compliance

Under current SoundCloud policies and with the assistance of the legal team at SoundCloud, the potential legal problems will be handled before becoming an issue. The legal team will do an evaluation of the information that is being used by the development team, and reference the legality or negative implications of such actions for every iteration of the product.

IntelliStream

StRS

1 Introduction

The way music is consumed has changed from an album format to a singles format, then to a playlist format, and now to a more dynamic auto-recommendation style of listening where users input minimal information to get highly personalized temporary playlists to satisfy their listening needs. In order to compete with contemporary music streaming platforms and to gain new listeners that would not previously engage, SoundCloud seeks the development of a plugin for their already available streaming format, by the name IntelliStream, that would allow new users to search a song, an artist's name, or other relevant search terms and listen to a variety of music without needing to interact any further with the platform.

1.1 Business Purpose

As the world's largest music and audio platform, SoundCloud lets people discover and enjoy the greatest selection of music from the most diverse creator community on earth. Since launching in 2008, the platform has become renowned for its unique content and features, including the ability to share music and connect directly with artists, as well as unearth breakthrough tracks, raw demos, podcasts and more. This is made possible by an open platform that directly connects creators and their fans across the globe. Music and audio creators use SoundCloud to both share and monetize their content with a global audience, as well as receive detailed stats and feedback from the SoundCloud community.

1.2 Business Scope

(a) SoundCloud Limited (soundcloud.com)

(b) Music streaming divisions on soundcloud.com include

- Playlists
- Artist Pages
- Search Engine

(b cont.) Many major streaming platforms, including Spotify, have all of the previously stated features (section 1.2 part b) and include the proposed autoplay system, IntelliStream. However, SoundCloud's liberal user upload policy allows for a variety of music that cannot be matched by its competitors.

(c) The proposed service takes data from current data acquisition and processing practices at SoundCloud and utilizes this information to inform the autoplay functionality. Thus, IntelliStream is a back end installation only, meaning that the already existing user interface will be utilized with minor modifications. All of the existing music streaming divisions would assist in the song recommendation process for IntelliStream. All of the user data aggregated, including listening time, song skips, searches, artists, and personal playlist entries will be condensed and calculated to inform music recommendations for users that are using the SoundCloud service for the first time, or otherwise.

1.3 Business Overview

SoundCloud Limited is interested in developing a music streaming service in the same vein as YouTube's autoplay recommendation model of music streaming to appeal to modern music listeners. SoundCloud wants to develop a service where users can simply input one song and have the rest of the songs automatically recommended based on user listening statistics. SoundCloud wants to improve new artist discovery and nullify the necessity of a playlist to consume a variety of music easily. Such a system would greatly incentivize new users to join as user playlist saturation and music burnout has been a rising point of conflict in music streaming.

1.4 Definitions

SoundCloud - Online audio distribution platform that allows its users to upload, record, discover new music and share it with other users.

Echo Nest - Music intelligence platform used by Spotify music streaming app to determine user's preference in music.

Artificial intelligence - machine learning process that can predict outcomes.

Autoplay System - Music streaming that automatically follows through a playlist without the need for consumer intervention.

Back End - The functional and algorithmic functionalities of a program that are masked by the interface the user interacts with.

End User - The consumer of the software.

Deep Learning - A subset of AI (Artificial Intelligence) that uses a specific machine learning practice that mimics human brain functionality in order to learn from data.

Audiophile - Clients that are interested in high fidelity music replay. In streaming, this means that clients are looking for high bitrate, meaning songs with more detail that are larger in size.

Product Ecosystem - Products produced by at least one company that share functionality between other products produced by this entity.

Beta release - A product that is shipped to clients in a state that is unfinished or needing tuning. Developers take input from users, fix bugs, and polish the product in order to have a smooth release with a fully functional product.

IntelliStream - The streaming service SoundCloud is seeking to develop in which users input a song, an artist's name, or other relevant search terms in order to automatically create a playlist that will autoplay with song recommendations that are very likely to fit a users taste, and that can change dynamically from user input data like skips, listen time, and other variables. An account bound playlist is not created for the user, but rather it is created temporarily, as long as the user is engaging with the product. On future engagements with this functionality, users will be given another temporary curated playlist.

1.5 Stakeholders

(a) Management

- Oversees daily operations of the project team and dictates the direction of the project development in accordance with SoundCloud's specifications.

(b) Project Team

- Will ensure the development of the software based on the needs of the end users, under the guidance of management.

(c) Marketing Team

- Deals with the marketing and deployment strategies associated with the IntelliStream product. The marketing team will ensure the product is advertised to targeted consumers through social media advertisements.

(d) Users

- Subscription and ad-listening users of the SoundCloud platform that require their needs to be met by the IntelliStream service.

(e) Business Analyst

- Analyses the company's business domain and documents the company's business processes.

(f) Regulator

- Enforces standards put in place by the company.

(g) Tester

- Responsible for SQA.

2 References

https://soundcloud.com/pages/contact

https://soundcloud.com/imprint

http://static.echonest.com/enspex/

https://expandedramblings.com/index.php/soundcloud-statistics/

3 Business management requirements

3.1 Business environment

Clients and Suppliers

The clients and suppliers share many roles in the lifecycle of products as SoundCloud. Clients consume the streamed music, while they also supply statistics to SoundCloud.

Competition and Owners

The competition includes other music streaming services. This includes Pandora, Spotify, Amazon, and YouTube. Spotify is the biggest competitor and has a music intelligence platform, “The Echo Nest”, which implements machine learning into their music streaming service. With this machine learning software, Spotify can accurately predict what music the user would like to listen to.

Improvements in Technology

With the integration of machine learning software, a user’s music preferences can be better understood by the software. As a result, software can predict and choose new recommendations for the user. This will also allow the user to discover new music based on their listening history without the need to search for it, providing a more enjoyable experience for the user.

Laws and Government Activities

The Music Modernization Act is currently in the process of being passed. This act will update existing music licensing laws to include streaming services.

Market, Social, and Economic Trends

Music streaming services are leaning toward acquiring artificial intelligence software for song predictions. With Spotify having acquired Echo Nest and Apple acquiring Shazam, trends in artificial intelligence with respect to music streaming services are emerging. With the use of artificial intelligence, music streaming services are providing their subscribers with a more

in-depth music playlist for their preferences and simplifies their music discovery process. Soundcloud is one of the largest music streaming platforms for new, rising artists and currently has no artificial intelligence prediction in use.

3.2 Goal and Objective

The goal of producing software is to increase market share in the music streaming marketplace and to add different means of acquiring money. SoundCloud wants to gain and retain more clients that will be consuming advertisements and subscribing to SoundCloud's premium service.

3.3 Business model

Offering

The music streaming industry is dominated by a few companies, including Spotify, Apple Music, Tidal, Soundcloud, and others. Spotify has a free streaming model where users receive advertisements between songs and they cater to music listeners by providing a large repository of popular artists and their music. Apple music shares the same music selection, for the most part. However, they only offer a subscription service and cater to clients that are in the Apple product ecosystem. Tidal, like Spotify and Apple Music, have a similar repository of music. However, they cater to audiophile listeners by offering higher quality music streaming than that of its competitors. SoundCloud fits into its own niche by providing a large repository of music that cannot be found on other streaming platforms, which are often produced by up-and-coming artists and popular artists alike. SoundCloud also shares the quality of having a free model of music consumption that Spotify has. SoundCloud is targeting frequent music listeners that want to discover new music and expand their horizons without manually doing research, thus only needing to make a free account at most.

SoundCloud is the largest concentrated music streaming platform for new artists to publish music. As such, the amount and variety of music on the platform are unmatched by any other dedicated streaming service.

Monetization

SoundCloud follows a free model of music streaming that includes advertisements that are played between songs. Users also have the choice of upgrading to SoundCloud's premium subscription which removes all advertisements from the website and gives access to all paid services on the SoundCloud platform at a monthly cost.

Similar to Spotify's performance model, SoundCloud will motivate users to switch to the SoundCloud's premium service during the advertisements. Thus, SoundCloud will be profiting from all of the users that use the platform.

Sustainability

SoundCloud already has a large repository of diverse music that other streaming platforms don't have access to. SoundCloud also has listening statistics for the unique music it offers, having been compiled over time.

SoundCloud's music streaming model is fundamentally immune to "fads" as is stands, as SoundCloud's music upload policy is very liberal, allowing a diverse variety of music. Legal action against SoundCloud is not a concern as SoundCloud pays royalties for all music requiring this sort of compensation, and as for user uploaded music, SoundCloud makes users sign an agreement stating the legal implications of uploading music on their platform. By providing this service, SoundCloud is not relying on clients or other entities to maintain their model to an extent that is not also expected by other popular music streaming platforms.

SoundCloud wants to keep developing products and optimizing its product lineup until SoundCloud reaches a 30% market share or drops to below a 22% market share. Upon reaching either of these points, SoundCloud will take steps to sell the company and have the CEO act as CEO Emeritus.

3.4 Information environment

Gmail

- Communication environment used for communication across the company.

Slack

- Communication environment used for communication across the development team and project manager.

Skype

- Communication environment meant for conference calls between the development team and project manager.

GitHub

- Used by developers to share code with others on the project team, allowing developers to work together on the IntelliStream project.

Google Drive

- Used by the management team, project team, and marketing team for sharing documentation. Documentation includes marketing strategies, client's needs, software architecture and standards involved in the project.

SoundCloud' Server

- Used to hold all information gathered by SoundCloud.

4 Business operational requirements

4.1 Business processes

Developers for SoundCloud conduct research on the users of the SoundCloud platform and users of other platforms that SoundCloud wants to gain users from. SoundCloud's research and data science team will interface with the development team in order to develop a list of features that must be present in the final product. The development team will also ask users to give their input via an email/notification which gives users a survey to take. The proposed survey will have

various questions regarding this style of streaming and will have a short response section where users will get to elaborate on their points and give further information. After this phase of development, the development team will move onto the system design, where the requirements will be integrated into the scaffolding of the IntelliStream product. The developers will take functional and non-functional requirements and implement them into a model, evaluate the model, then take the necessary steps in order to begin implementation. At the implementation stage, the developers will integrate information and code that they've acquired from other SoundCloud developers that is used in different products in order to create a shell of what the final product will be like. After this, the development team will start integrating components. After developing the main components, testing will be done in order to find any possible inconsistencies before being launched. Maintenance happens post development, in the same manner that other products in the SoundCloud ecosystem are maintained.

4.2 Business operational policies and rules

Workplace Health and Safety

The workspace shall consist of an office building. The office building shall have proficient natural ventilation. There will be a system to check indoor air quality. Based on the air quality there will be air purifier system keeping air quality at an acceptable level. Every room in the office building will have an individual climate control module, allowing the employees to specify different air temperatures and ventilation rates in each room. The office will be designed in a way that provides every occupant with access to natural light. There will be multiple windows so occupants can have outside viewing. All employees will be provided with wrist rests for their keyboards to provide comfort and wrist health when typing for a prolonged period of time. Doorways will not be blocked and all exits will be unlocked from inside the building. The office building will meet all requirements set by OSHA.

Code of Conduct

Company policies will apply to all employees regardless of their job title and rank.

Employees will avoid offending other employees.

Employees will avoid any serious disputes that could disrupt the workspace.

Any signs of discrimination will not be tolerated and may result in termination.

Employees will not use company computers to work on projects that they are not assigned to. Company computers are not to be used for personal affairs.

All company property should only be used to complete job duties.

There will be no formal dress code but employees are required to wear shirts, shoes, and pants. Employees are not permitted to wear shorts or sandals.

Employees are permitted to wear attire based on their religious beliefs.

Respect and Integrity will be shown by all employees towards customers, stakeholders, and the community.

All employees are required to sign a nondisclosure, preventing them from discussing company agendas outside of the workspace.

Social Media

Employees are expected to follow common sense practices when showing a public presence on social media platforms. When using social media, employees must ensure that opinions or statements made do not represent SoundCloud or any of its beneficiaries. Intellectual property or development details must not be shared with the public. Avoid any and all use of defamatory, offensive or derogatory content.

Disciplinary Action

Disciplinary action may be taken if an employee repeatedly or intentionally fails to follow the code of conduct. Disciplinary action will be decided based on the violation of these guidelines. Disciplinary action and can include:

- Demotion
- Suspension
- Termination
- Detraction of benefits for a set amount of time

Legal actions may be taken in cases involving corruption, theft, or any other unlawful behavior.

4.3 Business operational constraints

Time

Time will factor into the production of SoundCloud softwares through development time constraints. To ensure quality in the products that SoundCloud produces, SoundCloud allots an appropriate development time that encompasses all areas of the development process.

Assets

Access to top-of-the-line computing power and server bandwidth.

Terabytes of user streaming data which is stored in SoundCloud's database to be used in SoundCloud's IntelliStream product.

Already existing website functionality

76 Million active users. (10/27/18)

Quality assurance/testing candidates

Source of ad/subscription revenue.

Quality

The time and assets that SoundCloud offers are allocated in a way that the developers of IntelliStream will have a high standard of quality assurance. Developers work on the scaffolding created by previous SoundCloud developers, easing the process of development significantly.

Knowledge

Development of products in the SoundCloud ecosystem are supported by a large scaffolding of previous software developments and access to terabytes of user streaming data.

Stakeholder interest

As SoundCloud is a privately held company, the primary stakeholders that will be dealt with are company executives and developers of the product. Auxiliary stakeholders that do not have a direct tie to the company will also be considered in the development of the product.

4.4 Business operational modes

SoundCloud’s software development is largely done remotely, while some is done at the SoundCloud headquarters. As such, the development of products starts on a season/month that streaming volume begins to temporarily drop so that products in development or so the developers are able to collect more user responses.

4.5 Business operational quality

Quality

Planning

Our target audience is music listeners that are 13 to 35 years of age, as this is the largest market for online music streaming. Their need for novel music that cannot be found on other platforms and free streaming cannot be matched by competitors. Research will be done into how it can further appeal to this audience.

Assurance

The development plan for SoundCloud products will be scrutinized by management, other development teams, executives, and music industry professionals to insure successful product implementation.

Improvement

When SoundCloud products have their full launch, their development team will still follow the product closely for 6 months, monitoring performance and how it can be further improved through user experience. After this point, the product at hand joins SoundCloud's normal development/maintenance ecosystem, where improvements will be made to various areas of the experience at least twice during each year.

4.6 Business structure

SoundCloud has a private limited business structure. The private limited business structure will allow liability to be spread among all shareholders. Because the private limited business structure is considered to be a separate legal identity, members of the company are only responsible for actions taken by them and not by other members. The private limited business structure will also allow IntelliStream to be considered as a separate corporate entity in the eyes of the law. This results in IntelliStream not seizing development or operation even if the members of the company are deceased. IntelliSteam will start by having 50 shares spread out among shareholders. To create an award system, there will be 50 more shares that will be spread out among important employees that the board of stakeholders will decide on.

5 User Requirements

The user wants to have songs recommended to them automatically based on what they've listened to on SoundCloud in a streaming format.

The user wants other users' music listening metrics to influence the song recommendations provided by the product.

The user wants to be able to save the songs they are listening to to their public or private playlists.

The user wants to give information such as "liking" and "disliking" a song when listening to music in order to improve their recommendations.

The user wants to be able to search a song name, an artist's name, or other relevant search terms in order to start streaming the curated music.

6. Concept of proposed system

6.1 Operational concept

Operational policies and constraints

The system will be constrained to use the SoundCloud website and the SoundCloud app. In order for this service to operate, the use will need to have a stable web connection in order to send and receive data. The user must have a SoundCloud account in order to gain preference saving properties.

Description of the proposed system

The system will provide the user with automatic music shuffling with curated songs that come from user preference and from other users' listening habits according to what search query the user makes. The user will be able to give the songs that are playing a positive or negative rating in order to inform the recommendation system. Other user listening metrics will go into the recommendation process as well.

Modes of system operation

The system will have one main mode of operation, where the user queries the the SoundCloud website or application, and depending on the selection made, the user will

bein listening to a curated list of music. The user will be able to use other applications/do other tasks on their devices while being able to listen to the music.

User classes and other involved personnel

The user classes of this product include any and all persons who listen to music and the developers of the product.

Support environment

This product will be supported by the developers of the product for its development lifecycle, implementing maintenance and performance enhancing features alongside implementing/fixing user submitted errors/inconsistencies. When this product transitions into SoundCloud's normal maintenance lifecycles, the maintenance and performance enhancing measures will occur, however less frequently.

6.2 Operational scenario

Scenario 1: Music Listeners

Music listeners will launch the SoundCloud app on their phone/device or open the SoundCloud website on their browser of choice. The music listener will search on the SoundCloud interface for any song, album, artist, or other relevant keyword(s) for their desired music. Next to each result, there will be a button for users to be able to start streaming music using the IntelliStream product. The music listener will then be able to listen to the music they've selected, rate their current songs positively or negatively, and skip/go backwards on a selection as needed.

Scenario 2: Maintainers

Maintainers will be able to sign into a SoundCloud developer account on the SoundCloud website via a browser. From this account, the maintainers will have access to user listening

metrics. The maintainers will also be able to edit and code behind the IntelliStream system in accordance with whatever task is at hand. The maintainers will also be able to submit a request to publish any changes after a quality assurance review.

7 Project Constraints

The development of the product should not take more than 3 months to develop the main functionality, but the 12 months following this will focus on optimization. Thus, time should not be a strong constraint.

Capital to develop this system shall now be great, as the development team is small and the work is remote. The work required to accomplish the goals of this system will take less money to develop than an average SoundCloud product.

As the work is remote, the issue of personnel does not apply, as the work can be offloaded/supported by other developers.

Space is not a constraint considering that the work is being offloaded to a remote location.

User information regulations do apply to the curation algorithm, so the developers must not include information that users have not consent to have used.

8 Appendix

8.1 Acronyms and abbreviations

OSHA - Occupational Safety and Health Administration.

SQA - Software quality assurance.

IntelliStream

OpsCon

A.2 Operational concept document (OpsCon)

A.2.1 Scope

A.2.1.1 Identification

Identification Number: 1
Title: IntelliStream

A.2.1.2 Document overview

The purpose of this OpsCon document is to communicate the user's needs for and expectations of the proposed system to the acquirer and/or supplier.

A.2.1.3 System overview

The purpose of this system is to satisfy the user’s need for curated music streaming that implements SoundCloud’s repository of user submitted music. This product can be accessed for free while having to listen to advertisements, however, if a user has a subscription to SoundCloud’s premium service, they can stream the music without advertisements. This product is developed under SoundCloud, thus SoundCloud is sponsoring the user music streaming metrics, source code, and servers. This product can be used in any location that doesn’t have censorship restrictions and that has internet connectivity granted that the user is using an electronic device that has access to the SoundCloud application or a web browser that can access and load assets from the SoundCloud website.

A.2.2 Referenced documents

Document Number: 1
Title: IntelliStream StRS
Revision: 6
Date: 2/20/2019

A.2.3 Current system or situation

A.2.3.1 Background, objectives, and scope

SoundCloud has several systems in place that users use that can be implemented into a system as described in “A.2.1.3 System overview”. SoundCloud already manages music streaming, thus the required product should satisfy the algorithmic implementation of such a curated music system. Beyond providing features referenced in IntelliStream StRS Section 5, the system should not seek to complicate itself.

A.2.3.2 Operational policies and constraints

There are no constraints in time associated with this product, as listeners will always receive a curated product no matter the occasion. However, there are times where the music streaming slows down, thus resulting in an indistinguishable lower level of curation.

The system should not need to be operated by individuals, as the programming takes care of the curation. The system shall only need server maintenance done by staff at SoundCloud whenever the lifecycle of the product demands such an operation.

The product should be able to run on the large majority of devices that can access the internet and stream music, and/or download and operate the SoundCloud application.

The operation of this service does not require any facilities from a user standpoint but does require the use of servers that SoundCloud supports.

A.2.3.3 Description of the current system or situation

SoundCloud’s current systems in their lifecycle allow users to look up songs and artists, listen to their music and save it to their playlist(s), listen to this saved music, and listen to other users’ playlists. SoundCloud’s large repository or user submitted music is not integrated into a curated music streaming experience because of the expansive catalog with stark differences in user listening habits. The system that SoundCloud develops should algorithmically take user listening metrics and produce a curated playlist to enable music discovery that cannot be found on other platforms.

A.2.3.4 Modes of operation for the current system or situation

There are two main modes of operations that users undergo.

1) The user accesses SoundCloud's website via an internet browser, searches a song/artist/keyword, and listens to the song. Two alternatives could be that the user searches a playlist or accesses one of their own playlists and listens to these predetermined songs.

2) The user accesses the SoundCloud app, searches a song/artist/keyword, and listens to the song. Two alternatives could be that the user searches a playlist or accesses one of their own playlists and listens to these predetermined songs.

A.2.3.5 User classes and other involved personnel

1) Customers

2) Data analyst

3) Software maintainers

A.2.3.5.1 Organizational structure

A.2.3.5.2 Profiles of user classes

1) Customers are what the product is aimed for.

2) Data analyst distract data and use that to improve the the customer's experience.

3) Software maintainers maintain the product and make sure it operational.

A.2.3.5.3 Interactions among user classes

1) Customers interact with the software indirectly through the SoundCloud app, once the SoundCloud app is open the product is ran based on the user's song choice.

2) Data analyst pulls data from customers pick songs and creates better algorithms for the product.

3) Software maintainers make sure product is up to date and is returning accurate predictions to the customers.

A.2.3.5.4 Other involved personnel

SoundCloud does not interact with the product directly but the product will interact with SoundCloud's database to pull song recommendations. SoundCloud app maintainers operate their app indirectly of the product with the assumption the product is operational.

A.2.3.6 Support environment

The support environment will include the same support environment provided by SoundCloud. The product will offer support in the form of maintainers constantly keeping the product up to date. Our help desk for reporting issues in the product will be sent through the software program freshdesk. All issues will be monitored by the software maintainer developers.

A.2.4 Justification for and nature of changes

As the world's largest music and audio platform, SoundCloud lets people discover and enjoy the greatest selection of music from the most diverse creator community on earth. Since launching in 2008, the platform has become renowned for its unique content and features, including the ability to share music and connect directly with artists, as well as unearth breakthrough tracks, raw demos, podcasts and more. This is made possible by an open platform that directly connects creators and their fans across the globe. Music and audio creators use SoundCloud to both share and monetize their content with a global audience, as well as receive detailed stats and feedback from the SoundCloud community.

A.2.4.1 Justification for changes

a) No user recommendation for songs currently in place through the SoundCloud app.

b) Without song recommendations based on the users songs selection, the user might have a hard time finding similar music.

c) Many listeners are drawn to other music streaming devices such as Spotify because of the ease of finding similar songs to what user's preference to songs is. SoundCloud has a larger base of music to choose from and therefore could open up new opportunity for the customer to discover new songs based on their preference.

A.2.4.2 Description of desired changes

Capability changes - features to add include song playlist creation for customer. Playlist will be determined based on what songs the customer has listened to in the past.

System processing changes - Normally the song selection from the customer only be stored in the SoundCloud database. The product will access SoundCloud database to gather and store information based on the customer's song choice.

Interface changes - A new option for song playlist will be added to the main menu of the SoundCloud app to allow user to have access to it.

Personnel changes - hire specific developers to maintain the product software and possibly extra developers to handle the SoundCloud database interactions.

Environmental changes - SoundCloud database management and maintenance.

A.2.4.3 Priorities among changes

Essential features include new interface option for customers to access a newly created playlist recommendations based on what songs the customer has listened to through the SoundCloud application. Feature it is the only interaction between the customer and product.

A.2.4.4 Changes considered but not included

Selling user preference of songs by giving third party access to to the custom playlist the customer would receive. This was established as unethical and a breach of the customers privacy.

A.2.4.5 Assumptions and constraints

Assumption that customer will have access to the Internet in order to access the product. We also made the assumption that the customer will have at the least the minimum spec requirements to run the SoundCloud app. Assumption that the customer will have access to a phone that can reach the Internet or a computer. One of our constraints is having access to the SoundCloud database at all times.

A.2.5 Concepts for the proposed system

Customer will select songs to play through the SoundCloud app. Customers can give the songs they like a thumbs up or a thumbs down. If the customer selects a thumbs up icon the product will search through the SoundCloud database and pull back other songs that are similar to the songs the customer has “thumbs upped”. If the user selects a thumbs down icon for the songs, the product will alert SoundCloud to not play that specific song.

A.2.5.1 Background, objectives, and scope

The goal for the new system is for SoundCloud to receive moree subscribers. In adding the preference playlist, the system will make it easier for customers to discover new songs and because of SoundClouds vast service of streaming songs, customers will have access to more songs than normal song streaming services such as Spotify.

A.2.5.2 Operational policies and constraints

The system can only work when connected to the Internet. The system shall work on pcs and smartphones that have at least 4gb of 2200 mhz RAM.

A.2.5.3 Description of the proposed system

System will need access to the SoundCloud database in order to pull songs for the customer. System will not need a database since it working off of the SoundCloud database. System will perform its calculations for the customer within 2 mins (or the average length of a song).

A.2.5.4 Modes of operation

Regular mode is established when the system has access to the SoundCloud database. Degraded mode is when connections speeds are down and the system cannot perform required calculations in time to alert the customer of a recommended song.

A.2.5.5 User classes and other involved personnel

The customer is determined to have enough knowledge to know how to install the SoundCloud app onto their device. Data analyst should have enough knowledge to know how to pull data from the system. Developers are to maintain the system.

A.2.5.5.1 Organizational structure

Spotify is the major organizational structure and will provide the system with access to their database of songs.

A.2.5.5.2 Profiles of user classes

Customers provide data to the system and are considered to be what the system will act on.

SoundCloud is a streaming service that provides a large assortment of songs for the users.

Data analyst determine how the system could work better.

Developers maintain the system.

A.2.5.5.3 Interactions among user classes

Data analyst will communicate with the developers are how the system can be strengthened and the developers will modify the system based on the data analyst input.

SoundCloud provides the streaming service that our system will interact with.

A.2.5.5.4 Other involved personnel

Developers at SoundCloud when a new interface is introduced to the SoundCloud app. Executive managers are SoundCloud that determine how much access the system will have to the SoundCloud database.

A.2.5.6 Support environment

An online support site will be associate with the support access. All users can use this online site to report issues such as the system not running correctly or the system hindering other features in the SoundCloud app.

A.2.6 Operational scenarios

The product should let users search a song name, and artist's name, or some keyword that would allow them to reach a song that they are interested in. Upon finding the song, the option to begin a curated stream should pop up and let the user start streaming curated music instantly. The user should then be able to rate the song, skip the song, or go back to the previous song.

The rating system will have a positive and a negative icon in order for the user to inform the curation system.

The system should record all relevant listening metrics from users such as "time of skip" and "listened to n number of times".

A.2.7 Summary of impacts

Users will be impacted by this product via music discovery and listening diversity, which should grow their appreciation of the SoundCloud platform and use their products more often.

A temporary impact that should be seen in users is the proliferation of their playlists with new songs.

The impact of this product should result in much better curation metrics from user listening that should help the development process and the algorithm that recommends music.

A.2.7.1 Operational impacts

The more time that the proposed system operates, the more data will be accumulated for the curation system that should be taken into account in the recommendation algorithm.

A.2.7.2 Organizational impacts

Depending on the volume of proposed users in the system, the product should gain more analysts from SoundCloud in order to make decisions to better the music streaming process.

A.2.7.3 Impacts during development

The more data is accumulated in the system, the more analytical discussion there should be in the development process to enhance the music streaming process. Different prediction algorithms should be implemented for the curation process depending on the kind of music streaming data that is relevant to the system.

A.2.8 Analysis of the proposed system

A.2.8.1 Benefits

The main benefit of the proposed system is that users are able to have a far-reaching music discovery experience without doing any of the manual searching involved with this effort. The user will not need to go through myriad SoundCloud pages or outside resources to develop a curated list of potentially interesting artists and music. Users will be able to discover music in the diverse catalog that SoundCloud offers without needing to know anything about little known artists that are being recommended, alongside favorites that they have developed over time through streaming.

A.2.8.2 Disadvantages and limitations

A disadvantage that this system will hold is that users will not easily be able to provide feedback, namely the proposed rating system. to the music that they are listening to if they are

streaming the curated music in their car where they cannot or should not check their device. However, this feature is also missing from other popular streaming services.

A.2.8.3 Alternatives considered

An alternative that can be considered for the operational process is having the user interface with the product via voice to text, allowing a user that is not capable of navigating on their phone through normal means to communicate their desires in the app. This feature would also allow those who are doing potentially dangerous activities to not distract themselves with the operation at hand and communicate to their device via voice.

A.2.9 Appendices

A.2.10 Glossary

IntelliStream

SyRS

1. Introduction

This document was created by IntelliSteam for the SoundCloud corporation on March 15, 2019. This document was last updated on March 15, 2019. This is version 1 of the document.

1.1 System purpose

The way music is consumed has changed from an album format to a singles format, then to a playlist format, and now to a more dynamic auto-recommendation style of listening where users input minimal information to get highly personalized temporary playlists to satisfy their listening needs. In order to compete with contemporary music streaming platforms and to gain new listeners that would not previously engage, SoundCloud seeks the development of a plugin for their already available streaming format, by the name IntelliStream, that would allow new users to search a song, an artist's name, or other relevant search terms and listen to a variety of music without needing to interact any further with the platform. The addition of IntelliStream's auto-recommend service will be offered members who have a paid subscription with SoundCloud. This system will greatly incentivize new users to join as user playlist saturation and music burnout has been a rising point of conflict in music streaming.

1.2 System scope

The SoundCloud app provides its customers with the most unique and diverse selection of music. With a diverse selection of songs, SoundCloud has a unique opportunity to monetize an auto recommendation feature for its paid subscription users. SoundCloud currently does not have an auto recommendation system implemented. This causes the user to have to manually discover songs on their own. IntelliStream auto song recommendation service will observe all user's song choice selection and form connections to songs based on the information. For example, if a user listens to the song a and then song b, a connection will be formed between song a and song b. The more connections a song has with another song, the more it will show up for with the auto recommendation system.

1.3 System overview

1.3.1 System context

A user would access the SoundCloud website or app as they would normally and make a query for a song, artist, or other relevant information. Upon having song results from their query, they will have the option to click a button next to the play button that initiates the IntelliStream music curation system. The interface that the user interacts with will remain the same as it is implemented in SoundCloud's already established music listening modes, with one addition to the interface. The interface will have an additional thumbs up and thumbs down button in order for a user to be able to give more concrete input on their song preferences. Other listening metrics will be recorded by the system in the background without the user needing to give more input. The user does not need to give any input for the system to function. The user is able to listen to curated music in an auto-play playlist fashion.

1.3.2 System functions

The system uses a machine learning algorithm in order to predict what music a SoundCloud user would want to listen to according to their listening metrics and those of other users.

The system will allow users to further have their stance on the song validated by being able to vote up or down on a song using a rating system that informs the machine learning algorithm further about the user's preference.

The system will maintain all other functionality that is present in the song manipulation bar that all users currently use.

The system does not need any music streaming metrics in order to make "intelligent" decisions, so if there are no metrics for any reason, the system will default to playing music it would have without the proposed system.

This system will only work if a user has an established internet connection.

1.3.3 User characteristics

Customers

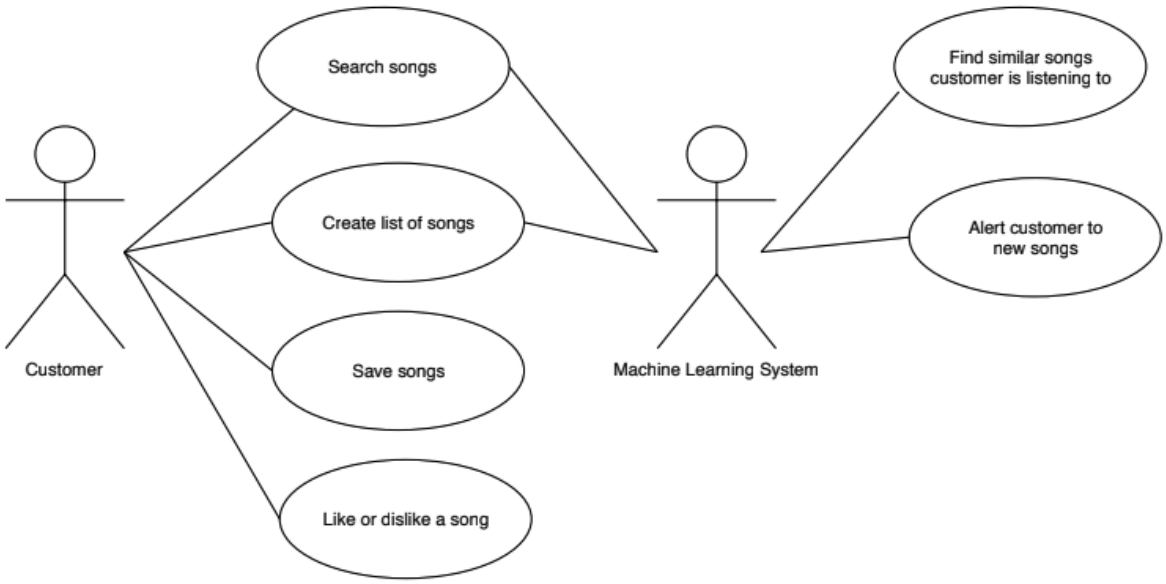
Customers will be able to listen to curated music provided by the IntelliStream system on SoundCloud anywhere if an internet connection is able to be established. The service can be accessed via most mobile devices with the SoundCloud app or with access to a browser. The service is also available on most personal computers with access to the internet.

Machine Learning System

The machine learning system will calculate song predictions using a machine learning algorithm and SoundCloud's remote processing power. The servers will be maintained by SoundCloud's contracted company.

Maintainers

Maintainers of the curation system will mostly deal with functions of the machine learning algorithm through back end accessibility means and do this remotely, as the servers are not maintained on the cite at SoundCloud.



1.4 Definitions

SoundCloud

Online audio distribution platform that allows its users to upload, record, discover new music and share it with other users.

Machine Learning

The process that can predict outcomes.

NoSQL

A type of database for storing data.

Autoplay System

Music streaming that automatically follows through a playlist without the need for consumer intervention.

Back end

The functional and algorithmic functionalities of a program that are masked by the interface the user interacts with.

End User/Customer

The consumer of the software.

Scrubbing

the process of moving quickly forward or backward through a song.

IntelliStream

The streaming service SoundCloud is seeking to develop in which users input a song, an artist's name, or other relevant search terms in order to automatically create a playlist that will autoplay

with song recommendations that are very likely to fit a users taste, and that can change dynamically from user input data like skips, listen time, and other variables. An account bound playlist is not created for the user, but rather it is created temporarily, as long as the user is engaging with the product. On future engagements with this functionality, users will be given another temporary curated playlist.

2. References

https://soundcloud.com/pages/contact

https://soundcloud.com/imprint

https://help.soundcloud.com/hc/en-us/articles/115003564308-Technical-requirements

https://www.getkisi.com/guides/server-room-security

3. System requirements

3.1 Functional requirements

1. The system shall allow the user to sign into the SoundCloud service using their associated email and password.

2. The system shall allow the user to search for songs, artists, and playlists on the SoundCloud platform using keywords in the search bar.

3. The system shall store user listening metrics in the SoundCloud servers.

3.2 Usability requirements

The user shall be able to access SoundCloud services upon:

Browsers

1. Chrome >= 40
2. Firefox >= 41
3. Internet Explorer 11
4. Safari 8

Mobile Operating Systems

5. iOS 10
6. Android 4.4 KitKat

3.3 Performance requirements

1. The system shall require the user to have an internet speed of at least 3mbs download per second in order for the minimum viable streaming service to be accessed.

2. The system shall require the user to have a mobile device or personal computer that has the capability of processing streamed audio.

3. The system shall require the user's device to have at least 2gbs of ram in order to have the best possible user experience.

3.4 System interfaces

1. The system shall require the user to interface with SoundCloud serves via a mobile device or a personal computer, fitting the specifications outlined in 3.2 and 3.3.

2. The system shall require an audio output via embedded speakers, desktop speakers, an auxiliary audio extension (headphones), or any other means of producing a sound to listen to music on the SoundCloud platform.

3.5 System operations

3.5.1 Human system integration requirements

Usability

1. The user shall be able to operate SoundCloud's services without needing an account to be signed into.

2. The user shall be able to communicate with customer support on a 24 hour basis every day of the year or be able to communicate via email with customer support and be answered within 48 hours.

3. The user will be able to leave the SoundCloud service at their will leaving no trace of their account on the platform.

Operational Suitability

4. The system shall not have more than one hour of downtime and at any particular data center.

5. The system shall not wholly go down as the system must have multiple data access points to maintain dependability.

Sustainability

6. The system shall distribute data among different data centers at various locations and be able to be revived via data duplication.

3.5.2 Maintainability

1. The system shall validate listening metrics every 24 hours.

2. The system back end shall be openly accessible to maintainers.

3. The system server shall be accessed by those contracted to maintain servers by SoundCloud.

3.5.3 Reliability

1. The system must be online and functional in order for SoundCloud services to be deployed.

2. The system must undergo maintenance and validation every 24 hours in order to ensure reliability.

3.6 System modes and states

1. The system have one main mode of operation, as described.

3.7 Physical characteristics

3.7.1 Physical requirements

1. The system shall require several servers across most several continents in order to secure data storage and for quick access.

3.7.2 Adaptability requirements

1. The server system associated with SoundCloud shall be able to be upgraded in data transfer speed and the speed at which server processes occur.

3.8 Environmental conditions

1. The system shall be stored in a server so its natural environment will be in a temperature controlled environment more likely the same server in which the SoundCloud data are stored.

2. The system shall suffer the same electromagnetic signal tampering a typical server would encounter.

3. The server shall be stored in a stone building with adequate shield plates to block electromagnetic activity.

3.9 System security

1. The maintainers/developers shall not look at or use information that the user did not sign off on.

2. The system's back end shall only be accessed by maintainers and any and all changes must be approved by the project manager.

3. The system shall record all changes, login attempts/times, and users accessing services in a maintenance log that can be referenced by the project manager.

4. The customers using the product shall only have access to the interface given to them by their SoundCloud client.

3.10 Information management

1. The system shall only use listening metrics and other relevant information that users agree to disclose for use by SoundCloud.

2. The system shall take in this information and send this to every SoundCloud server around the world for reproducibility.

3. The system shall not allow sensitive information to be accessed by any person.

4. The system will hide any sensitive information in order to reduce the effectiveness of potential attacks.

3.11 Policies and regulations

1. The developers shall only develop on loaned SoundCloud devices, as they are not permitted to use any personal devices.

2. All features developed shall use stubs and drivers in order to test and certify functionality.

3.12 System life cycle sustainment

1. The system shall have uptime checks every minute.

2. Analysts shall use the listening metrics in order to inform business decisions.

3. The system shall receive yearly hardware upgrades including server capacity and speed, and processing power.

3.13 Packaging, handling, shipping and transportation

1. The system shall stay in a specific geographical location and transport its data via a wide area network.

2. The system's subsystems shall work locally to the system.

4. Verification

System Requirements	Verification Method

3.1.1	D
3.1.2	D
3.1.3	D
3.2.1	D
3.2.2	D
3.2.3	D
3.2.4	D
3.2.5	D
3.2.6	D
3.3.1	I
3.3.2	I
3.3.3	I
3.4.1	D
3.4.2	I
3.5.1.1	D
3.5.1.2	I
3.5.1.3	D
3.5.1.4	I
3.5.1.5	D
3.5.1.6	D

3.5.2.1	D
3.5.2.2	D
3.5.2.3	I
3.5.3.1	D

3.5.3.2	I
3.6.1	D
3.7.1.1	I
3.7.2.1	D
3.8.1	I
3.8.2	D
3.8.3	I
3.9.1	I
3.9.2	I
3.9.3	D
3.9.4	D
3.10.1	D
3.10.2	D
3.10.3	D
3.10.4	D
3.11.1	I

3.11.2	I
3.12.1	D
3.12.2	I
3.12.3	I
3.13.1	I
3.13.2	D

5. Appendices

5.1 Assumptions and dependencies

1. Users will have access to either a phone or pc to use the product.
2. The features will be available to all SoundCloud customers.
3. The system will handle data securely.

5.2 Acronyms and abbreviations

- Intelligent- accurate prediction for what the user may want to listen to.
- Mbs- Megabits per Second
- Gb- gigabyte

IntelliStream

SRS

1. Introduction

1.1 Purpose

The purpose of IntelliStream is to streamline the music listening and discovery process for all users of the SoundCloud platform by curating and automatically playing music that the user is likely to enjoy. This service is intended to increase the market share for SoundCloud as a music streaming platform and create stronger user relationships with the platform via unique music discovery that other platforms do not offer.

1.2 Scope

The software that is to be produced for the SoundCloud platform is called IntelliStream. The software will utilize a machine learning algorithm in order to curate music automatically using the user's listening metrics along with the listening metrics of other users. The curated music shall play automatically, enabling listeners to simply initiate the streaming process and having discovery and music streaming handled for them. The user will be able to search for a song, an artist, or any other relevant keyword in order to find a song that they shall then have the option to turn into an "IntelliStream" session, where the curation takes place.

1.3 Product overview

1.3.1 Product perspective

IntelliStream will be integrated into the already established SoundCloud music streaming platform. IntelliStream will use the same interface for music streaming that SoundCloud already has implemented, aside from minor surface level changes in the music manipulation panel. The user will interface with this application via a web browser on a personal computer or mobile device, or through an application on a mobile device. The user will be able to interface with this product via clicking/tapping on the interfaces as it applies. IntelliStream interfaces with the SoundCloud software for most of its non-machine-learning operations, and then interfaces with the SoundCloud servers for data used for music curation.

1.3.2 Product functions

The product will have the user click a special “IntelliStream” button on a chosen song, as opposed to the default “play” button, in order to enable the IntelliStream functionality and begin streaming curated music. The user is then recommended songs that the user is likely interested in and that is corroborated in interest from other users of the SoundCloud platforms. These songs will be automatically played after one ends. The user will be able to give feedback via a “thumbs up” or “thumbs down” in order to inform the algorithm better for their taste. All other music streaming metrics recorded by the user will be considered in the curation process.

1.3.3 User characteristics

IntelliStream is meant to be used by all demographics and age groups, irrespective of any other conditions. IntelliStream adopts the usability of the SoundCloud system and decreases its

complexity by allowing users to be able to possibly click one button and have music they're interested in play.

1.3.4 Limitations

IntelliStream will need to run the machine learning software in the background of the SoundCloud app interface and as such is dependant on the use of the SoundCloud app. Hardware for IntelliStream software will be limited to that of SoundCloud's hardware. This is to integrate IntelliStream machine learning software into SoundCloud's software environment and ensure proper communication between both systems. The machine learning system should be available 99 percent of the time and the system will have to perform updates when SoundCloud creates updates for its interface.

1.4 Definitions

Machine Learning - A method for a computer to "learn" or confidently choose certain outcomes.

Autoplay - A type of music streaming that continues playing new music for the user until they stop the streaming.

Listening Metrics - Information extract from users listening to music. "How long did the user listen to this song?", "Did the user replay this song?", "Was the song skipped?", etc.

2. References

SoundCloud SyRS

3. Specific requirements

3.1 External interfaces

Name: Mobile Device
Description: A device such as a cell phone, tablet, or other such device that allows the user to interface with applications or web pages via a touch-sensitive screen or attached/wireless keyboard interface.
Source of Input: Via tapping on a touch-sensitive screen or by inputting keyboard clicks through wired or wireless means.
Relationship: Inputs are given and output is displayed on an attached screen.

Name: Personal Computer
Description: A device, either a laptop, desktop, or other computer, that can load web pages and handle the load described in the SyRS for SoundCloud's system.
Source of Input: A keyboard, mouse pad, mouse, or other such input device.
Relationship:Inputs are given and output is displayed on an attached screen.

3.2 Functions

1. The SoundCloud system shall take care of the input validation in the song search component of the IntelliStream product use case.

2. The user shall be able to engage the IntelliStream system by selecting a song using the SoundCloud search algorithm outlined in the SyRS.

3. The user shall be able to provide feedback in the form of a binary "upvote" and "downvote" system for a song that they are currently listening to in the IntelliStream mode.

4. The user shall be able to give information to the curation system using listening metrics outlined in the SyRS.

5. The system shall terminate execution of SoundCloud services for a specific client experiencing overflow and give an error message denoting this.

6. The system shall give an error message denoting that a proper connection must be established to SoundCloud systems in cases that the user's internet speed is lower than noted the SyRS.

7. The system shall have specific error messages and associated error codes appear where applicable.

8. The system shall gave a generic error message when an unexpected error occurs.

9. The parameters shall be dealt with SoundCloud's current system, as outlined in the SyRS.

10. The system shall take input from the user without the user needing to specify music preferences and automatically output the result as a song recommendation.

11. The system shall use a machine learning algorithm in order to perform input to output conversion.

3.3 Usability Requirements

1. The system shall maintain a 90% or greater approval rating by users in terms of curation satisfaction.

2. The system shall maintain a 90% or greater approval rating by users in terms of song rating impact.

3.4 Performance requirements

1. The system shall be able to simultaneously host 100 million connected devices.

2. The system shall only use floating point values and integer values in order to process information.

3.5 Logical database requirements

1. The System's Information shall be placed into neo4j database.
2. The system shall have access to the the databases being used by SoundCloud.
3. A new node shall be created in neo4j for the user of the SoundCloud app that will hold their own listing habits and be associated with their account.
4. Users of the SoundCloud app shall have access to read from their own node in neo4j.
5. The machine learning system shall write to the user's node.
6. Information shall be written in the form of JSON objects and placed into the neo4j database.
7. Nodes in neo4j shall have access to read from other nodes in the same system.
8. Data shall first go through a transaction to preserve data when data is being pushed to the database.

3.7 Software system attributes

1. The system shall undergo stress testing before the deployment of the IntelliStream system using SoundCloud's stress testing processes.
2. The system shall keep its files sharded across different data storage locations across SoundClouds' global databases to maintain availability.
3. The system shall encrypt all data that is input and output of the IntelliStream system.
4. The system shall log all actions and events that occur during the listening process of all users.
5. The system shall encapsulate the execution of the IntelliStream system away from the other processes in the SoundCloud ecosystem.

6. The system shall test the lower and up limits of values relating to the input and outputs of the IntelliStream system.

7. The system shall have exception catching measures to mitigate functionality lockup in regards to inputs and outputs.

8. The system shall not expose, or decrypt, sensitive user information for any entity.

9. The system shall utilize the music streaming functionality of the SoundCloud system and only need to deal with data processing in the machine learning component of the IntelliStream system.

10. The system shall be dependent on the already established elements on SoundCloud for at most 90% of operation.

11. The system shall be dependent on the already established code on SoundCloud for at most 90% of operation.

12. The system shall be written in non-proprietary programming languages for all processes.

13. The system shall run on a linux server.

3.8 Supporting information

The following SRS statements should be considered in the development of the IntelliStream system.

1. The system shall use JSON data in order to transfer information.

2. The system shall allow a user to play a single song and have a playlist generated and autoplayed for them using a machine learning curation system.

3. The system shall be deployed using a container specifically made to host the machine learning processes behind the music curation.

4. Verification

3.2.1	D
3.2.2	D
3.2.3	D
3.2.4	D
3.2.5	D
3.2.6	D
3.2.7	D
3.2.8	D
3.2.9	D
3.2.10	D
3.2.11	I
3.3.1	I
3.3.2	I
3.4.1	D
3.4.2	I
3.5.1	I
3.5.2	D
3.5.3	D
3.5.4	D
3.5.5	D

3.5.6	I

3.5.7	D
3.5.8	D
3.7.1	D
3.7.2	D
3.7.3	D
3.7.4	D
3.7.5	I
3.7.6	D
3.7.7	D
3.7.8	I
3.7.9	D
3.7.10	I
3.7.11	I
3.7.12	I
3.7.13	I
3.8.1	I
3.8.2	D
3.8.3	I

5. Appendices

5.1 Assumptions and dependencies

It is assumed that the operating system on the devices using the SoundCloud system will be able to download and interact with the SoundCloud app or be able to successfully access and utilize all of the web features of the SoundCloud system.

It is assumed that the user is human.

It is assumed that the user has basic knowledge of interacting with websites and/or software applications.

5.2 Acronyms and abbreviations

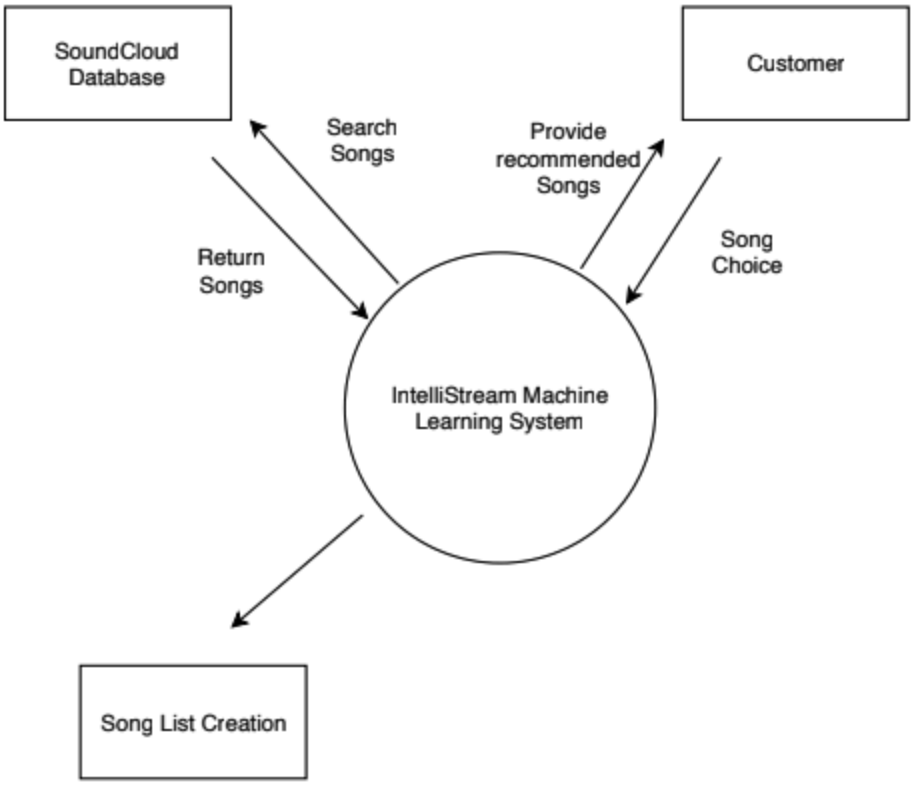
JSON - JavaScript Object Notation

Neo4J - Graph database management system

IntelliStream

Diagrams

D.1 Context Diagram



D.2 Usecase Diagram