Transfer Learning Software Use Cases

1. Personas

1.1. Business Owner

Sean

age: 33
residence: Washington, DC
education: Bachelors Degree (BA)
occupation: Business Owner
marital status: Single | No children

Anything is possible, if I'm willing to put the work in.

Sean is juggling many projects and priorities. He appreciates help from his vendors and employees. When tackling something new he prefers to do some research then consult an expert.

Comfort With Technology

INTERNET

SOFTWARE

MOBILE APPS

SOCIAL NETWORK

Criteria For Success:

When a project achieves its goals on time and on budget while delighting users.

Needs
- Tangible results
- To have project self manage

Wants
- Start small
- See results before spending more money

Values
- Detailed planning
- Concrete expectations
- Decisions backed up by analytics or data

Fears
- Failure
- Wasting money
- Being too hasty

The business owner has a dataset (e.g. labelled images, videos, or product reviews) and a great idea for an image classifier, text classifier, object detector, or similar. They need to create a model using no code or very low code. Initially, they don't need high accuracy or top performance. They are a subject matter expert in their business domain and want to see if their idea for an application will work. They need to quickly determine the feasibility of training a model on a small data set to solve a problem in their business area. They might be interested in running a simple example end-to-end on a generic dataset in order to evaluate whether or not to adopt the tool.

1.2. Data Scientist

Jeanna

age:	36
residence:	Seattle, WA
education:	Doctorate (PhD)
occupation:	Data Scientist
marital status:	Married | 1 child

With the right SW, HW, and data, we can make the right decisions.

Jeanna is an expert in statistics and machine learning who understands the entire lifecycle of developing a model that maximizes accuracy and performance.

Comfort With Technology

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Criteria For Success:

When the data tells a consistent story that empowers our customers.

Needs
- Sufficient tools and compute power
- Flexibility and patience to do her best work
- Support from management

Wants
- Clean, organized datasets
- Realistic requirements

Values
- Clear communication
- Challenging problems to model

Fears
- Failing to deliver on a commitment
- Buggy or slow software

The Data Scientist understands the general data modeling workflow and knows their dataset very well. They may or may not be an expert in deep learning, but they are versed in the mathematics behind machine learning and are tasked with developing a model that balances high accuracy and good performance. They are responsible for selecting a model architecture, training algorithm, and hyperparameters and they will be comfortable with programming languages and environments. They need to be able to experiment and iterate quickly and see detailed metrics reports.

1.3. ML/MLOps Engineer

Ricky

age:	Late 20's
residence:	Portland, OR
education:	Masters Degree of Computer Science (MS)
occupation:	Machine Learning Engineer
marital status:	Married	No children

I'm excited to work with new technology that solves real-world problems.

Ricky likes to focus deeply on one aspect of a project and drive it to completion. He prefers to use existing best practices but does not hesitate to come up with novel solutions when needed.

Comfort With Technology

INTERNET

SOFTWARE

MOBILE APPS

SOCIAL NETWORK

Criteria For Success:

When a pipeline is operating with maximum throughput

Needs
- Performant and reliable systems
- To be involved in development and deployment

Wants
- Latest and greatest tech stack
- Responsibility/ownership over projects

Values
- Detailed specifications
- Collaboration with teammates

Fears
- Disappointing Users
- Producing a bad product

The ML Engineer is responsible for deploying the selected model into production and updating the model if it is to be fine-tuned with new data on a regular basis. They will scale the training and/or production environment if required by the business. They might need to take a training workflow from a Data Scientist with most or all parameters defined and run it to convergence as efficiently as possible.

2. User Stories

These follow the format "As a **<ACTOR/PERSONA>**, I want to **<ACTION>** so that **<GOAL>".** Note that the generic "User" is used when multiple personas would be interested in the action and goal.

1. AIZOO-788: As a Data Scientist, I want to run a TL use case with low code and visually verify that it worked so that I can quickly prototype a model with some degree of accuracy
2. AIZOO-789: As a ML Engineer, I want to run a TL use case with a CLI and display accuracy metrics so that I can choose a good model balancing accuracy with performance
3. AIZOO-830: As a User, I want to print a list of available models by use case and framework so that I can make an informed selection for my experiment
4. AIZOO-831: As a User, I want help understanding and verifying the formatting requirements for my dataset so that I can run my experiment without error

5. [AIZOO-832](#): As a Business Owner, I want to run an example TL workflow E2E (re-train, evaluate, export, and deploy) so that I can understand the whole process and see if my application is possible
6. [AIZOO-833](#): As a User, I want to checkpoint the model so that I can resume training later without starting over
7. [AIZOO-834](#): As a User, I want to have a log of my experiment that completely describes the inputs so that I can track everything I have tried and reproduce previous results if needed
8. [AIZOO-835](#): As a ML Engineer, I want to run TL to convergence, or to a minimum level of accuracy, given some specifications from a Data Scientist so that I can get the most accurate model

3. Initial Use Cases

3.1. Use Case 1: Build and Evaluate a CV Model with Low Code

Actor: Data Scientist

Scope and Preconditions: The use case starts when the user has finished identifying and prepping a dataset and has started up their Jupyter Notebook environment. It ends after the user has obtained accuracy and performance metrics for the training and validation subsets, visualized a successful prediction, and exported a model.

Flow: The interactions and basic flow are similar to the current Jupyter notebooks. The user imports the transfer learning toolkit and requests to display some usage options. The system will show the options for frameworks, use cases (i.e. categories like "Image Recognition" and "Text Classification"), and available pretrained models. Then, the user selects a combination of options to apply to their training experiment and requests the API to run it on the training subset for a specified number of epochs. The system will train the model and give periodic output logs. Then, after training completes, the user can request (a) evaluation metrics to be calculated on the validation subset, (b) single-batch prediction and visualization of the result, and (c) model export to a local output directory.

3.2. Use Case 2: Build and Evaluate a CV Model with No Code

Actor: ML Engineer

Description: The use case starts when the user has finished identifying and prepping a dataset and has installed the transfer learning command line interface (CLI). It ends after the user has obtained accuracy and performance metrics for the training and validation subsets and exported a model.

Flow: The user requests to display some usage options in the terminal. The system help command will show the basic syntax and subcommand options for frameworks, use cases (i.e. categories like "Image Recognition" and "Text Classification"), and available pretrained models. Then, the user constructs a command to train a model on the dataset and runs it, seeing periodic output metrics in the terminal. After training completes, the user can construct more commands to (a) evaluate accuracy and

performance on a validation set, (b) perform single-batch prediction/inference, and (c) export the model to a local output directory.