

# ModelKB DB - DeepData

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## Team Members

**Brett Recker** - Class ID: 22 <br>

**Redwan Al Badawi** - Class ID: 1

## A Database System for Deep Learning

Deep learning experiments provide a rich set of artifacts which include the model's architecture, the weights of the models, a set of hyperparameters, and several other files. We were tasked with building a database system that can handle storing these artifacts, query and retrieve these artifacts in a team manner, and provide the capability to compare two or more versions in the database.

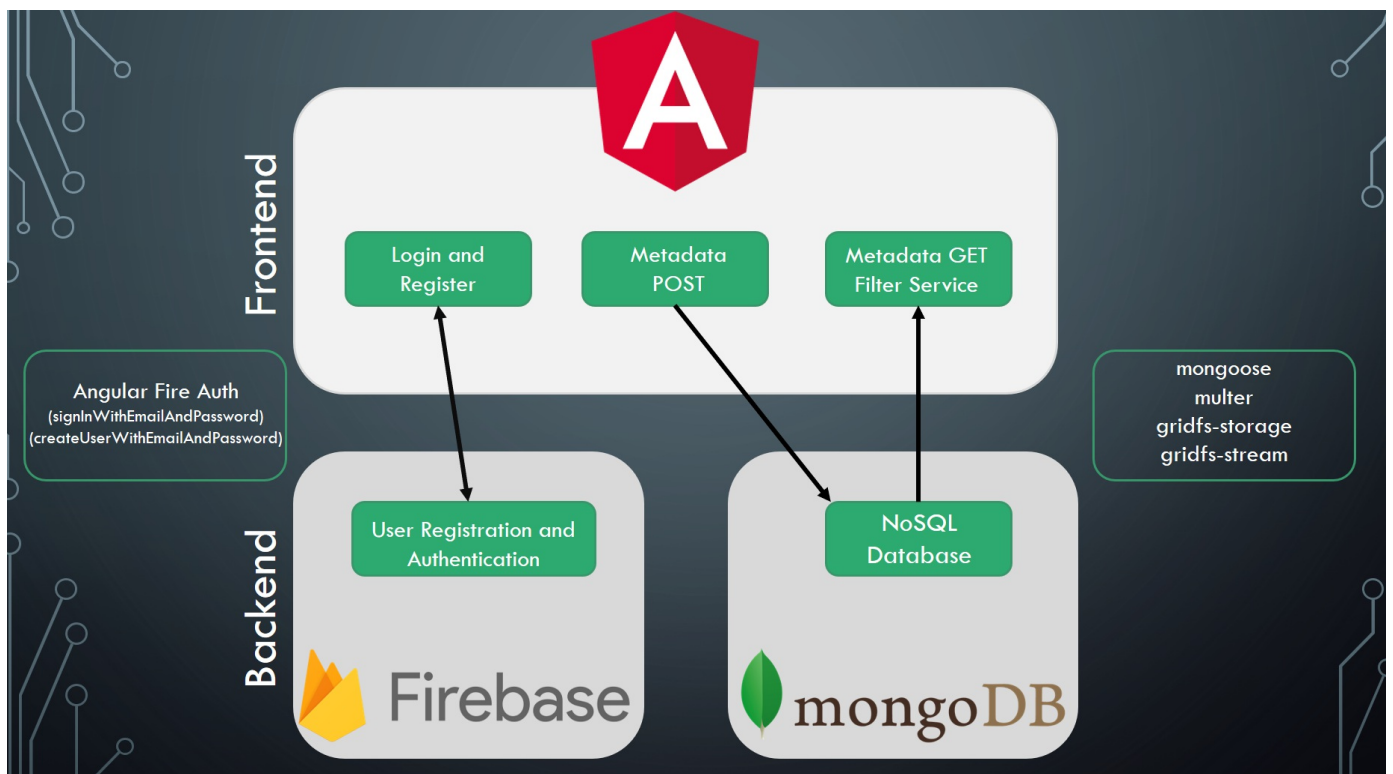
## Project Goal

Our objective was to create a user friendly web application for uploading Deep Learning experiments and also provide users with the ability to view existing experiments from all projects. We also tried to implement functionality for comparing artifacts between two or more experiments.

# Technologies and Applications




## Architecture



# Login/Register UI

Below is our Login page UI :

 ModelKB DB

Login


Email Address:

Password:

Login

New User? [Register](#)

Forgot your password? [Reset](#)

 ModelKB DB

New User Registration

Email Address:

Password:

Confirm Password:

Register

Existing User? [Login](#)

## The Upload and Display for model file



# ModelKB DB

[Logout](#)

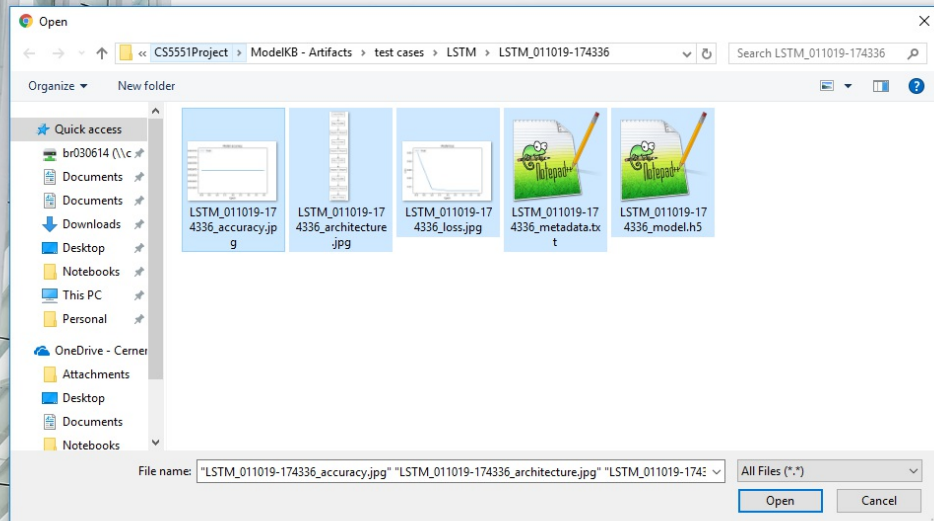
## Upload File

[Choose Files](#)

No file chosen

[Upload](#)

Project \*



```
const storage = new GridFsStorage({
  url: mongoURI,
  file: (req, file) => {
    return new Promise( (executor: { resolve, reject }) => {
      crypto.randomBytes( size: 16, callback: (err, buf) => {
        if (err) {
          return reject(err);
        }
        const filename = file.originalname;
        const bucketname = file.originalname.substring(0, file.originalname.lastIndexOf("_"));
        const fileInfo = {
          filename: filename,
          bucketName: bucketname
        };
        resolve(fileInfo);
      });
    });
  },
});

const upload = multer( options: { storage });

app.post('/api/upload', upload.array("uploads[]", 12), (req, res) => {
  //console.log(req.name.substr(0, req.name.indexOf('-')));
  res.json({array: req.array});
});
```

# ModelKB DB

## Upload File

Choose Files

5 files

Upload

LSTM\_011019-174336\_accuracy.jpg

LSTM\_011019-174336\_architecture.jpg

LSTM\_011019-174336\_loss.jpg

LSTM\_011019-174336\_metadata.txt

LSTM\_011019-174336\_model.h5

Project \*

CONTEXT

Project 0

+ Create Database

NAMESPACES

PROJECT

Clusters

Alerts 0

Backup

Access

Settings

Stitch

Charts

Docs

Support

ModelKB

uploads

CNN011019-220151.ch...

CNN011019-220151.files

CNN011019-220728.ch...

CNN011019-220728.files

CNN011019-221140.ch...

CNN011019-221140.files

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

FashionMnist\_020119-1...

LSTM\_011019-173749.c...

LSTM\_011019-173749.fi...

LSTM\_011019-174042...

LSTM\_011019-174042...

LSTM\_011019-174336...

LSTM\_011019-174336....

uploads.LSTM\_011019-174336.files

COLLECTION SIZE: 935B TOTAL DOCUMENTS: 5 INDEXES TOTAL SIZE: 8KB

Find Indexes

FILTER {"filter": "example"}

QUERY RESULTS 1-5 OF 5

\_id: ObjectId("5cd38d8bcc0c5f6408e81cd1")

length: 26325

chunkSize: 261120

uploadDate: 2019-05-09T02:16:43.861+00:00

filename: "LSTM\_011019-174336\_architecture.jpg"

md5: "50faac61576dc0f6a2188f3e5392205e"

contentType: "image/jpeg"

\_id: ObjectId("5cd38d8bcc0c5f6408e81cd0")

length: 17912

chunkSize: 261120

uploadDate: 2019-05-09T02:16:43.861+00:00

filename: "LSTM\_011019-174336\_accuracy.jpg"

md5: "b93c2a9cd91fd6e170d6c47435d7b6ed"

contentType: "image/jpeg"

\_id: ObjectId("5cd38d8bcc0c5f6408e81cd2")

length: 16401

chunkSize: 261120

uploadDate: 2019-05-09T02:16:43.977+00:00

filename: "LSTM\_011019-174336\_loss.jpg"

md5: "2fffd51aee47cdd1c36d883b0542b64e"

contentType: "image/jpeg"

\_id: ObjectId("5cd38d8bcc0c5f6408e81cd3")

length: 271

chunkSize: 261120

uploadDate: 2019-05-09T02:16:43.861+00:00

filename: "LSTM\_011019-174336\_metadata.txt"

md5: "9b5cf46f0d56a05e6199a269dfe82d"

contentType: "text/plain"

Also added two drop downs to the page for searching/selecting experiments and displaying their associated artifacts:

```

1 <div class="input-form">
2   <h3>Upload File</h3>
3   <input class="mat-raised-button" type="file" (change)="onFileSelected($event)" multiple/>
4   <button class="btn-primary" type="button" (click)="onUpload()">Upload</button>
5
6   <div class="row" *ngIf="filesToUpload?.length > 0">
7     <div class="table">
8       <ul class="files" *ngFor="let file of filesToUpload">
9         <li><a>{{file.name}}</a></li>
10      </ul>
11    </div>
12  </div>
13 </div>
14
15 <mat-form-field class="project-form">
16   <mat-label>Project</mat-label>
17   <mat-select required (selectionChange)="projectSelect($event.value)">
18     <mat-option value="CNN">CNN</mat-option>
19     <mat-option value="FashionMnist">FashionMnist</mat-option>
20     <mat-option value="LSTM">LSTM</mat-option>
21   </mat-select>
22 </mat-form-field>
23
24 <mat-form-field *ngIf="files" class="experiment-form">
25   <mat-select required (selectionChange)="experimentSelect($event.value)">
26     <mat-label>Experiments</mat-label>
27     <div *ngFor="let file of files">
28       <mat-option *ngIf="file.name.includes($event) > 0 && file.name.includes('files') > 0" value="{{file.name}}>{{file.name.substring(0, file.name.lastIndexOf('.')}}</mat-option>
29     </div>
30   </mat-select>
31 </mat-form-field>
32
33 <div *ngIf="files1" class="experiment-files">
34   <div *ngFor="let fLink of files1">
35     <a href="/api/file/{{event}}/{{fLink.filename}}">{{fLink.filename}}</a>
36   </div>
37 </div>
38

```



```

onFileSelected(fileInput: any) {
  this.filesToUpload = fileInput.target.files as Array<File>;
}

onUpload() {
  const fd = new FormData();
  const files: Array<File> = this.filesToUpload;
  console.log(files);

  for (let i = 0; i < files.length; i++) {
    fd.append( name: 'uploads[]', files[i], files[i].name);
  }
  this.http.post( url: '/api/upload', fd)
    .subscribe( next: res => {
      console.log(res);
    });
}

projectSelect(event) {
  this.event = event;
  this.files1 = '';
  console.log('EVENT -> ' + this.event);
  this.http.get( url: '/api/all')
    .subscribe( next: res => {
      this.files = JSON.parse(JSON.stringify(res));
      console.log(this.files);
    });
}

experimentSelect(event) {
  this.event1 = event.substring(0, event.lastIndexOf('.'));
  console.log('EVENT 1 -->' + this.event1);
  this.http.get( url: '/api/collection/' + this.event1)
    .subscribe( next: res => {
      this.files1 = JSON.parse(JSON.stringify(res));
      console.log(this.files1);
    });
}
}

```

# ModelKB DB

## Upload File

Choose Files

No file chosen

Upload

Project \*

CNN

Experiments

CNN011019-220151

CNN011019-220728

CNN011019-221140



# ModelKB DB

## Upload File

Choose Files

No file chosen

Upload

Project \*

CNN

\*

CNN011019-220151

CNN011019-220151\_architecture.jpg

CNN011019-220151\_metadata.txt

CNN011019-220151\_accuracy.jpg

CNN011019-220151\_loss.jpg

CNN011019-220151\_model.h5

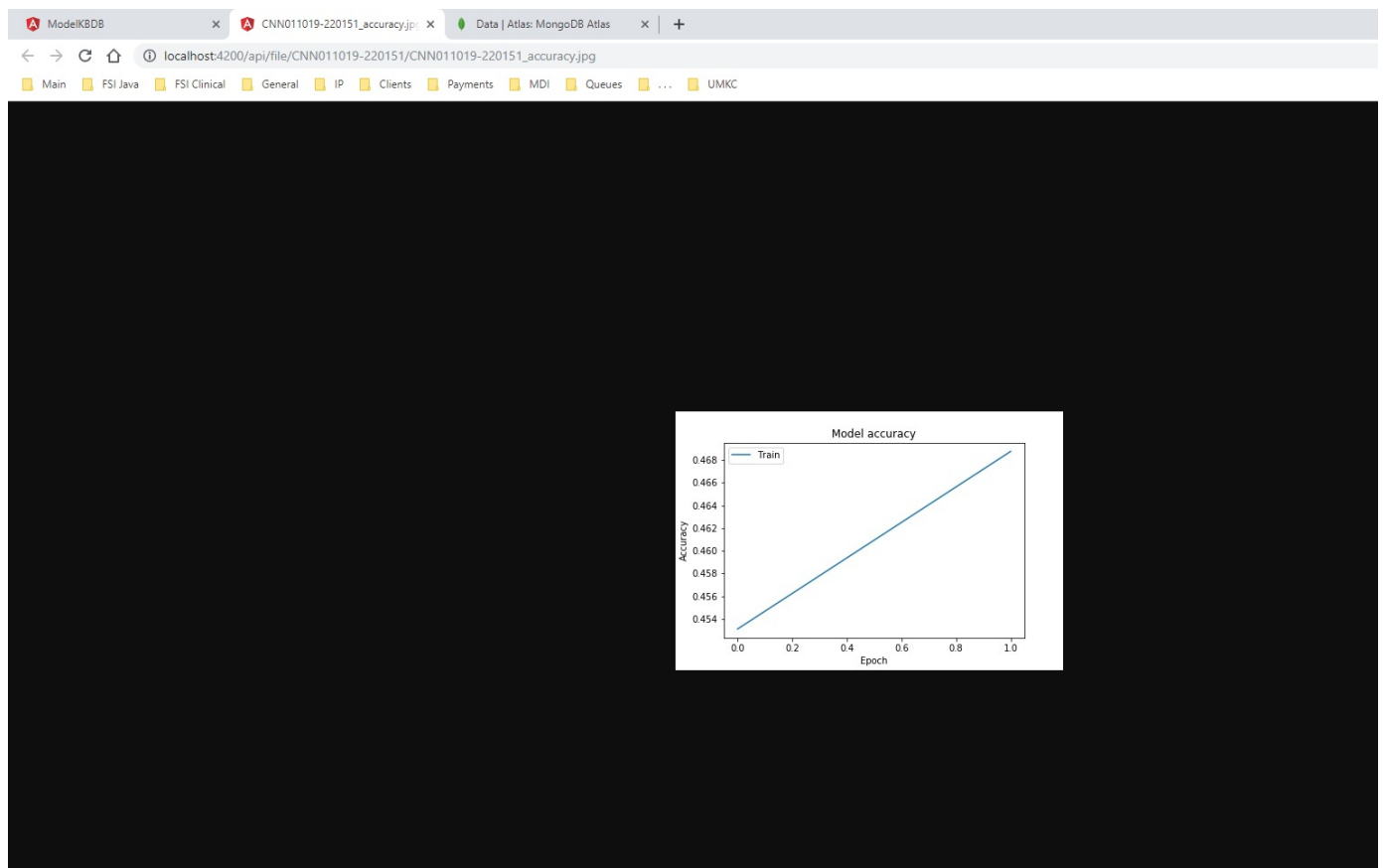
This required a new get route to be added to the app.js file for returning all collections in MongoDB:

```

app.get('/api/all', (req, res) => {
  conn.db.listCollections().toArray((err, collInfos) => {
    if(!collInfos) {
      return res.status(404).json({
        err: 'No Collections Exist'
      });
    }
    return res.json(collInfos);
  });
});

```

Clicking these links will open the artifacts in a separate window:



ModelKBDB x localhost:4200/api/file/CNN0110 x

localhost:4200/api/file/CNN011019-220151/CNN011019-220151

Main FSI Java FSI Clinical General IP Clients Pay

```
model_name:CNN011019-220151
framework:keras 2.2.2
size:9793.952 kilobytes
epochs:2
layersCount:7
InputTensors:(None, 64, 64, 3)
OutputTensor:(None, 1)
Optimizer:Adam
LossFunction:binary_crossentropy
AccuracyValue:0.46875
LossValue:0.7201308608055115
model_name:CNN011019-220151
framework:keras 2.2.2
size:9793.952 kilobytes
epochs:2
layersCount:7
InputTensors:(None, 64, 64, 3)
OutputTensor:(None, 1)
Optimizer:Adam
LossFunction:binary_crossentropy
AccuracyValue:0.46875
LossValue:0.7201308608055115
```

Clicking the hyperlink for a .h5 file automatically downloads it:

ModelKBDB x Data | Atlas: MongoDB Atlas x +

localhost:4200/modeldb

Main FSI Java FSI Clinical General IP Clients Payments MDI Queues ... UMKC

# ModelKB DB

## Upload File

Choose Files No file chosen Upload

Project \*  
CNN

\*  
CNN011019-220151

CNN011019-220151\_architecture.jpg  
CNN011019-220151\_metadata.txt  
CNN011019-220151\_accuracy.jpg  
CNN011019-220151\_loss.jpg  
CNN011019-220151\_model.h5

CNN011019-22015....h5  
9.5 MB

##Search Part

ModelKB DB

+

Model Number

model_name	InputTensors	OutputTensor	Optimizer	Accuracy	Value
test	1	1	1	1	
test2	2	2	2	2	
test3	3	3	3	3	

ModelKB DB

Logout

+

Model Number

test2

model_name	InputTensors	OutputTensor	Optimizer	Accuracy	Value
test2	2	2	2	2	

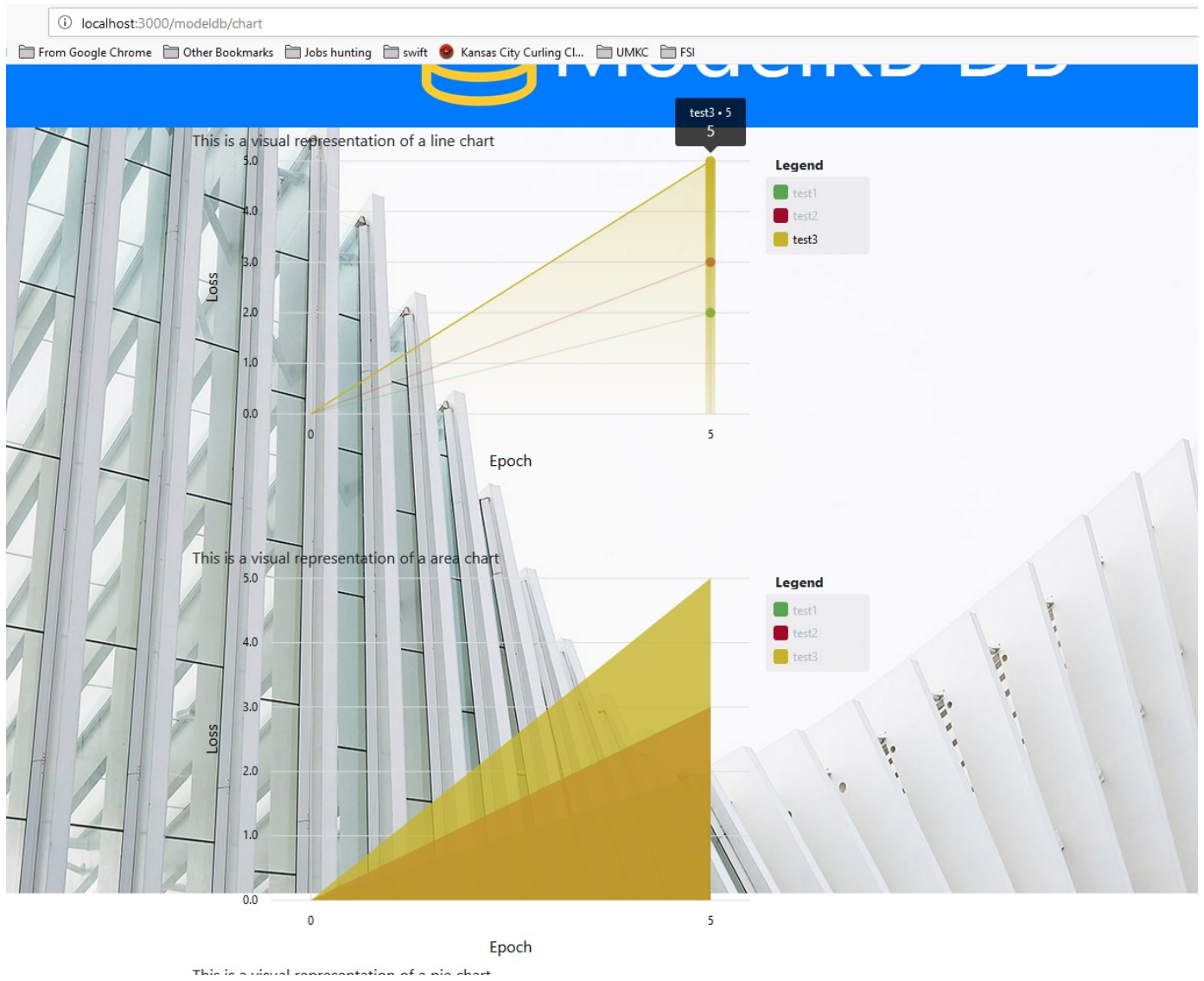


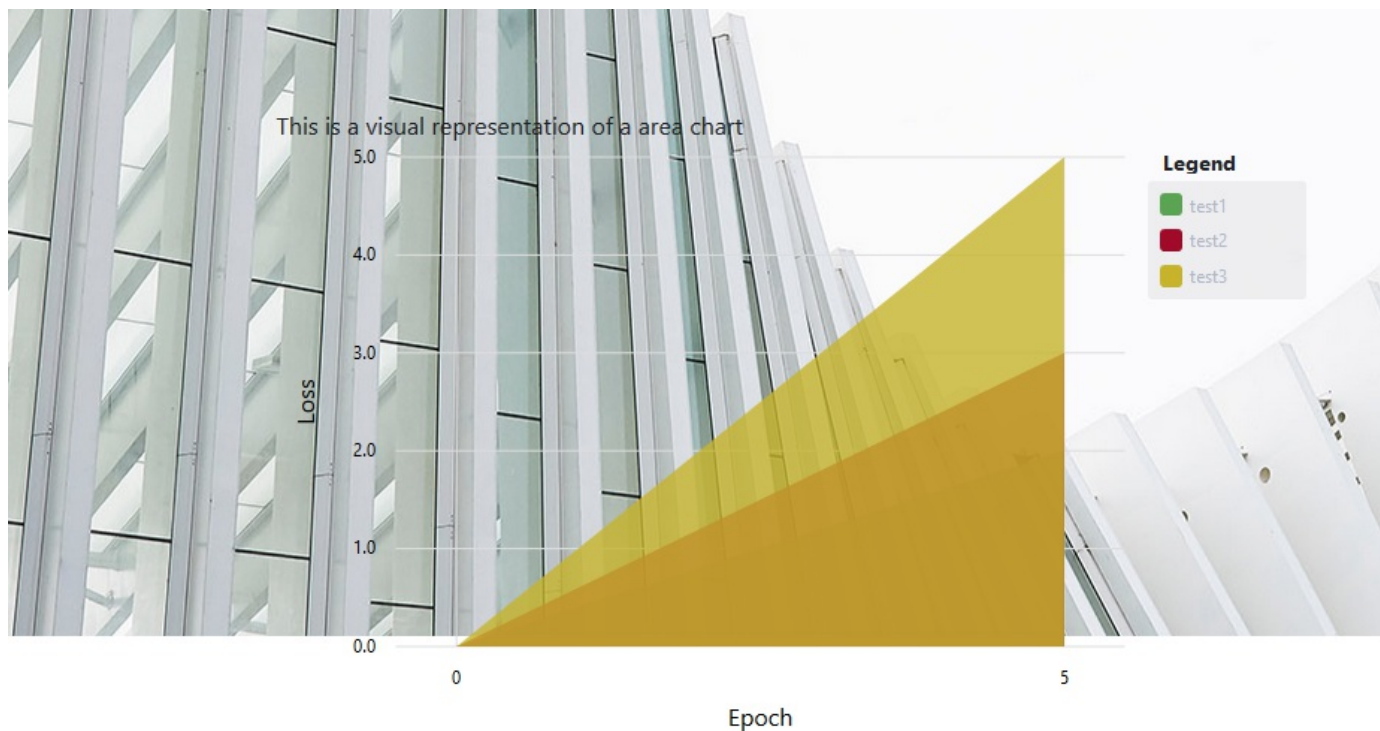
```
3 <div> This is a visual representation of a line chart</div>
4 <div style="display: inline-block">
5   <ngx-charts-line-chart
6     [view]="view"
7     [scheme]="colorScheme"
8     [results]="multi"
9     [gradient]="gradient"
10    [xAxis]="showXAxis"
11    [yAxis]="showYAxis"
12    [legend]="showLegend"
13    [showXAxisLabel]="showXAxisLabel"
14    [showYAxisLabel]="showYAxisLabel"
15    [xAxisLabel]="xAxisLabel"
16    [yAxisLabel]="yAxisLabel"
17    [autoScale]="autoScale"
18    [timeline]="timeline"
19    (select)="onSelect($event)"
20  >
21 </ngx-charts-line-chart>
22 </div>
```

```
68
69
70   view: any[] = [700, 400];
71
72   // options for the chart
73   showXAxis = true;
74   showYAxis = true;
75   gradient = false;
76   showLegend = true;
77   showXAxisLabel = true;
78   xAxisLabel = 'Epoch';
79   showYAxisLabel = true;
80   yAxisLabel = 'Loss';
81   timeline = true;
82
83   colorScheme = {
84     domain: ['#5AA454', '#A10A28', '#C7B42C', '#AAAAAA']
85   };
86
```

##Chart For Compare part







This is a visual representation of a pie chart

