FUTURAE

Future-proof, user-centric Authentication

www.futurae.com

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Blitz:

Detecting "Fake Support" attacks that circumvent 2FA

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The leading provider of Authentication

Futurae offers a specialized platform for authentication and transaction confirmation catered to banks and financial institutions, elevating both **security** and **usability**.

Proven track record in **minimizing operational** and **helpdesk costs**.

100+ customers

40+ countries of customers

25M+ authentications a month

CyberTech 100 2019-2021

2020 Efma Capgemini winner of Retail and Commercial Banking

2018 **Gartner Cool Vendor** in Identity and Access Management

Build trust, not inconvenience

The Futurae Platform authenticates your users. However you want it. Wherever they are.

Agenda

- Blitz scope
- Data & initial challenges
- Underlying models
- Results

Intro: Why Blitz

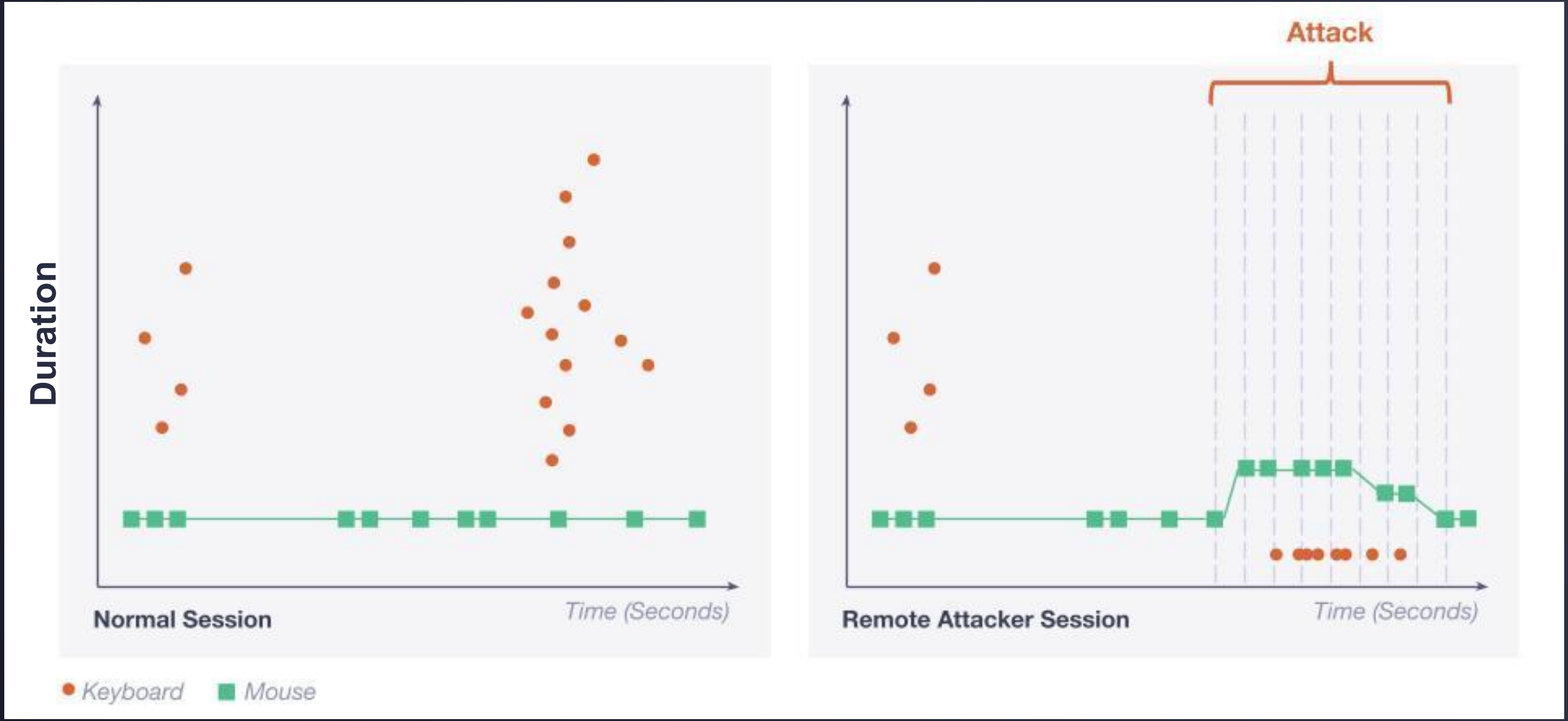
Protection against so-called “fake technical support” attacks with web banking:

- User installs remote desktop tools (e.g., TeamViewer) and grants access to attacker
- Victim follows instructions, proceeds with login & strong customer authentication
- Then performs a transaction to “whitelist” an attacker’s controlled IBAN
- Attacker “takes over” the session and performs a larger transaction as from the victim

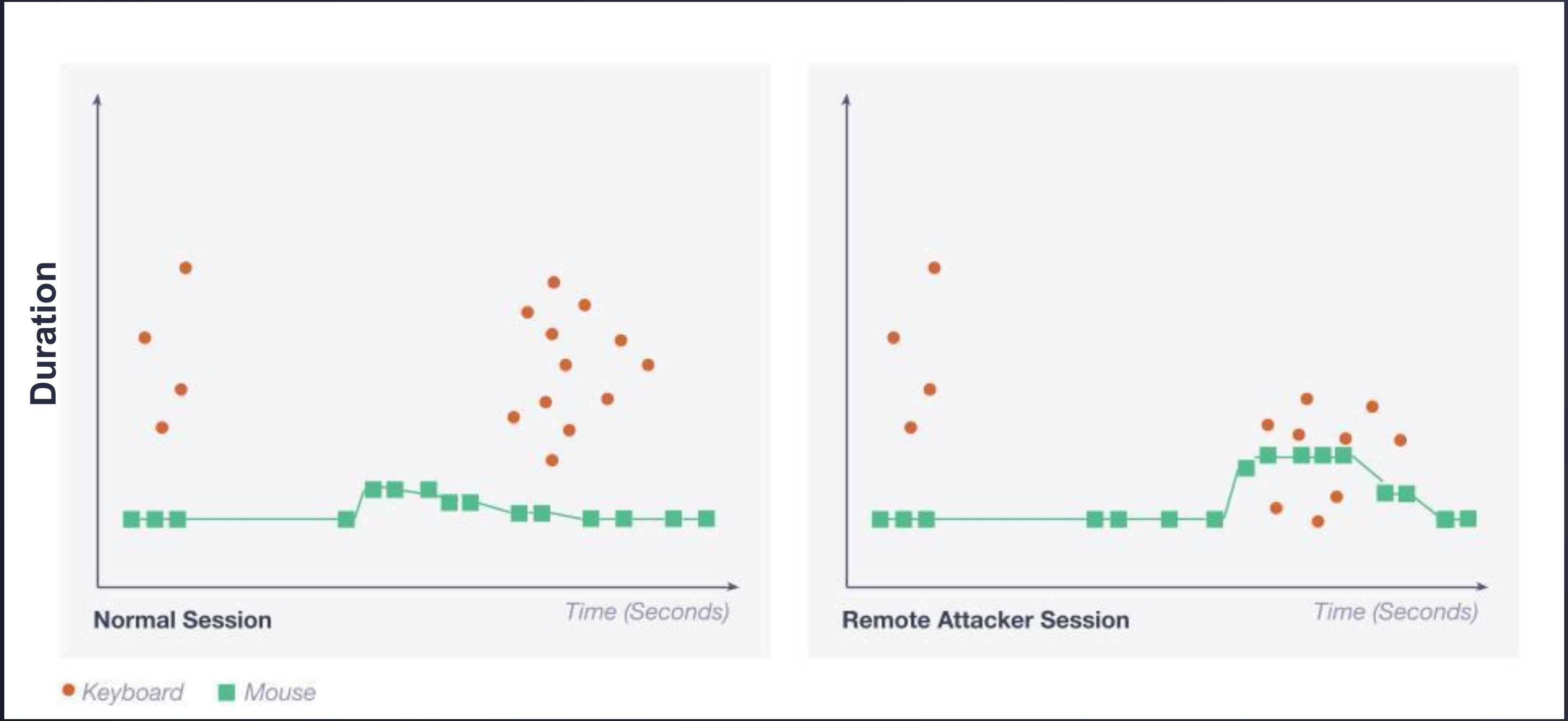
Detection:

- Blitz.js records “misbehaviours” from the user’s side based on keyboard and mouse interactions (recorded in JS in the browser), building a ML model in the backend

The data


Attack
Duration
Normal Session
Time (Seconds)
Remote Attacker Session
Time (Seconds)
● Keyboard
■ Mouse

The data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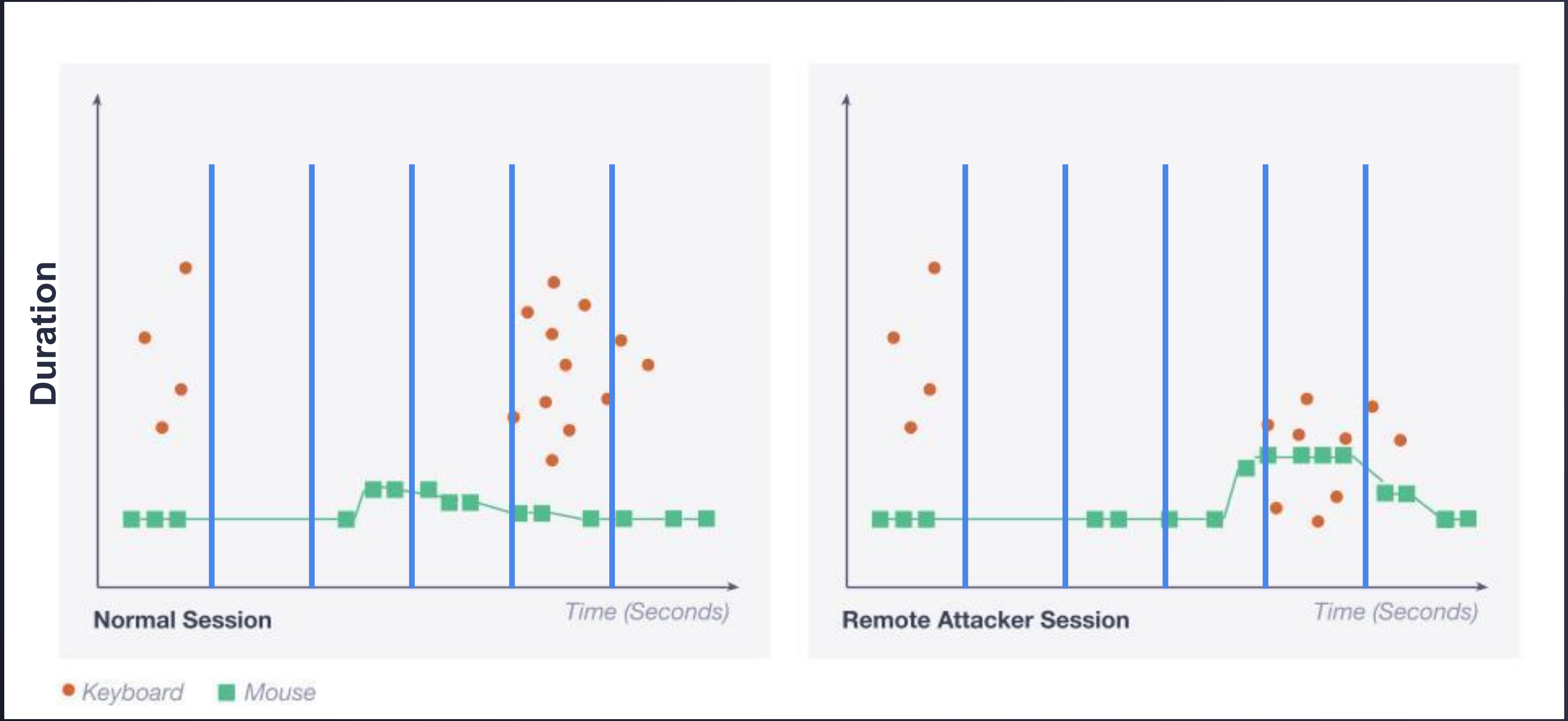

Duration
Normal Session
Time (Seconds)
Remote Attacker Session
Time (Seconds)
● Keyboard
🟩 Mouse

Initial approach & challenges

XGBoost model had 30-50% Recall and 5% False Positive Rate

Goal:

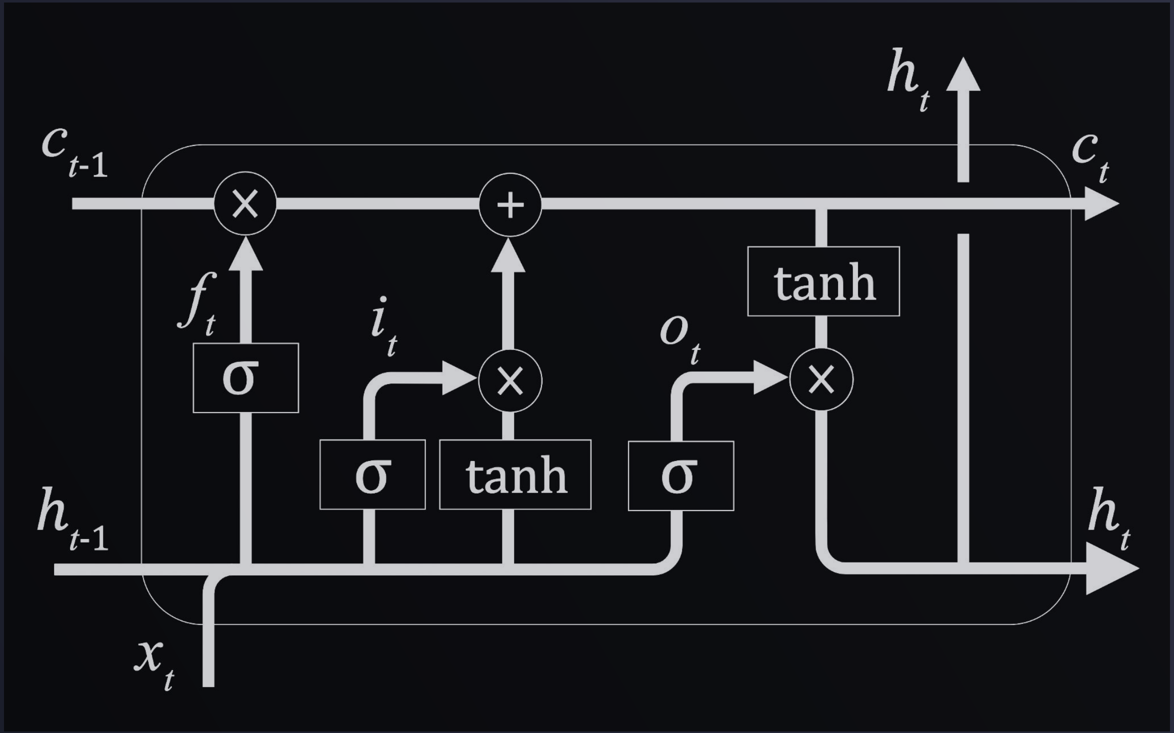
- High Recall → We want to reduce the FNs
- Low FPR → We want to reduce the FPs

Initial approach & challenges

XGBoost model had 30-50% Recall and 5% False Positive Rate

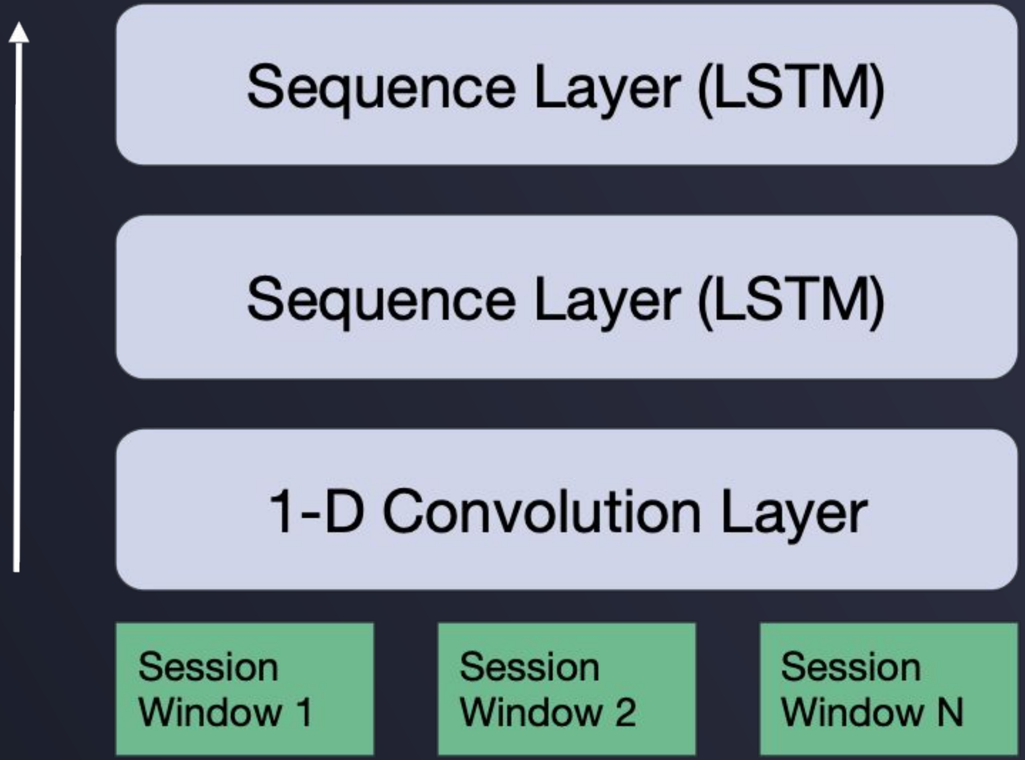
- Extremely imbalanced datasets
- ~25% of reported attacks are without key presses
  ~50% of sessions are without key presses
- Sessions vary highly in terms of events

New model deployment - LSTM



Beltran-Hernandez *et al.*,
doi: 10.3934/mbe.2020293

CNN-LSTM Architecture



Sequence Layer (LSTM)

Sequence Layer (LSTM)

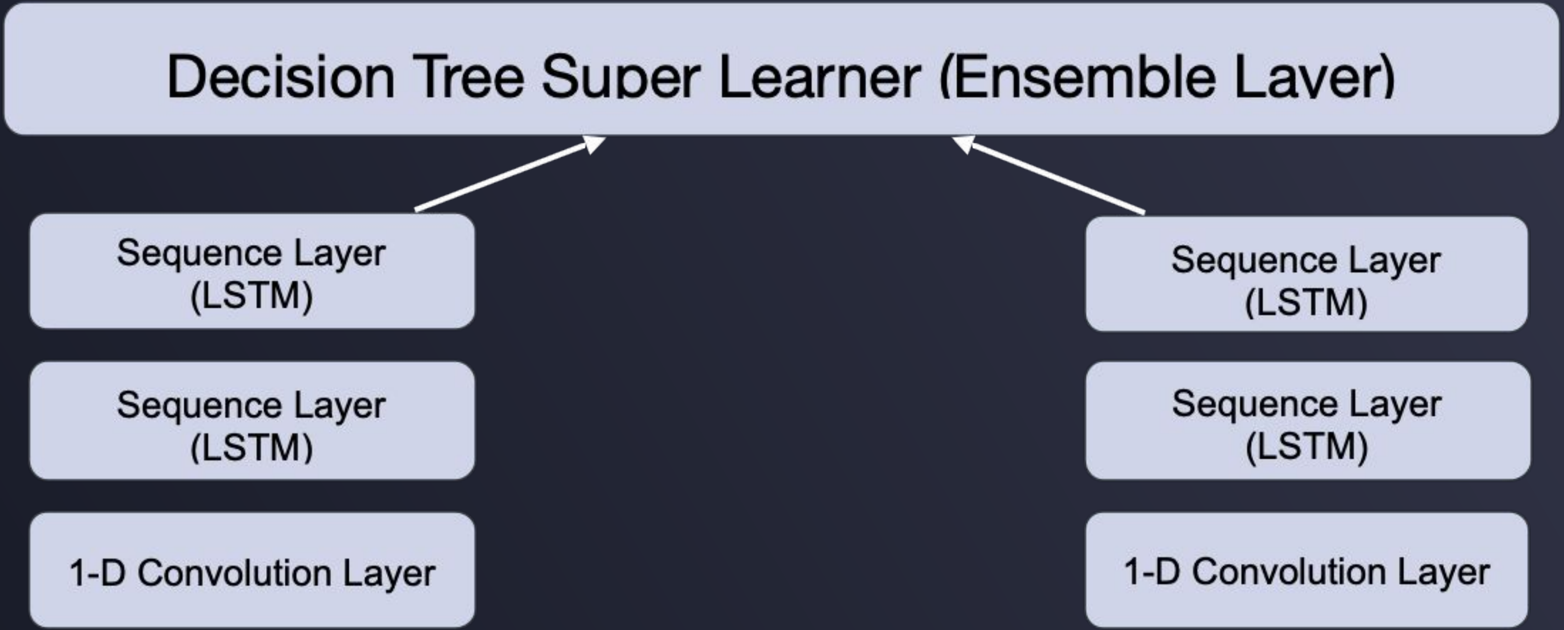
1-D Convolution Layer

Session Window 1

Session Window 2

Session Window N

CNN-LSTM Ensemble



Decision Tree Super Learner (Ensemble Layer)

Sequence Layer (LSTM)

Sequence Layer (LSTM)

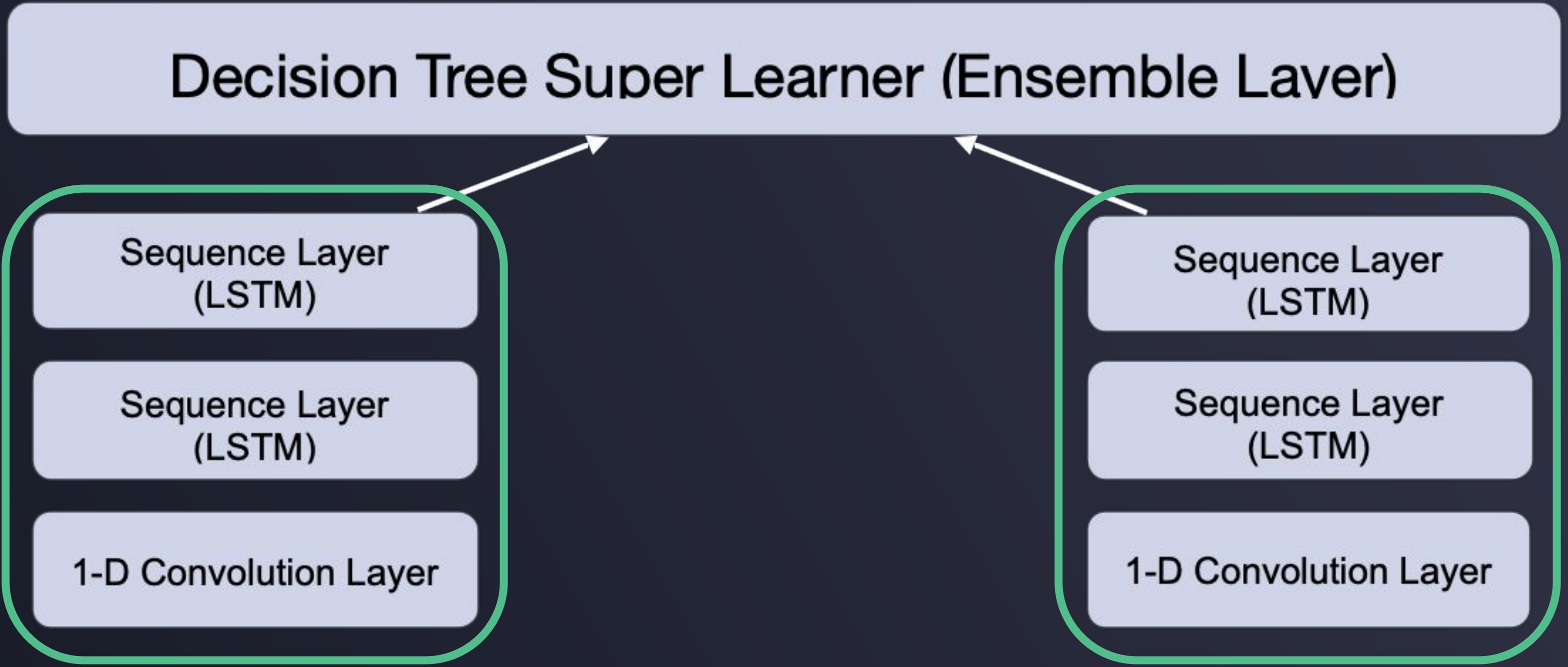
1-D Convolution Layer

Sequence Layer (LSTM)

Sequence Layer (LSTM)

1-D Convolution Layer

CNN-LSTM Ensemble



Normal Sessions: Day 1 + All Attacks

Normal Sessions: Day N + All Attacks

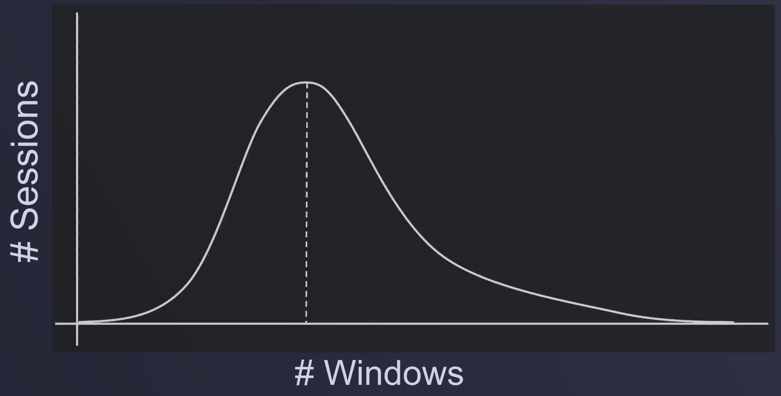
Data processing enhancement

Built synthetic data

- **Augmentation:**

  Padded all short sessions

  by duplicating existing windows.



- **Boosting with bootstrapping:**

  Resampled existing attacks to generate new ones.

CNN-LSTM Results Summary

	JUN			JUL			AUG			
	Total att.	Found	**Recall**	Total att.	Found	**Recall**	Total att.	Found	**Recall**	**FPR**
MMs	21	14	**0.66**	31	22	**0.70**	4	3	**0.75**	**0.023**
KPs + MMs	12	11	**0.92**	17	13	**0.76**	4	3	**0.75**	**0.027**

- Recall in range of 75-95%
- FPR at 2-3%

Open improvements

Accuracy could be improved even further:

1) Build models per User
→ This will further reduce FPR and allow us to increase the recall

2) Generate further synthetic attack data
→ Higher boosting factor

We are hiring!

- Senior Data Engineers (Zurich/Remote)
- Senior Data Scientists (Zurich/Remote)
- Senior Software Engineers, Backend (Zurich/Remote)
- Senior iOS Engineers (Zurich/Remote)
- Senior Android Engineers (Zurich/Remote)

→ For more openings: futurae.com/careers

12	Nationalities
7	Languages
34%	Women
7	PHDs
24	Master degrees

THANK YOU

Zürich
Schweiz

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