



REDES NEURAIS E DEEP LEARNING

# SÉRIES TEMPORAIS

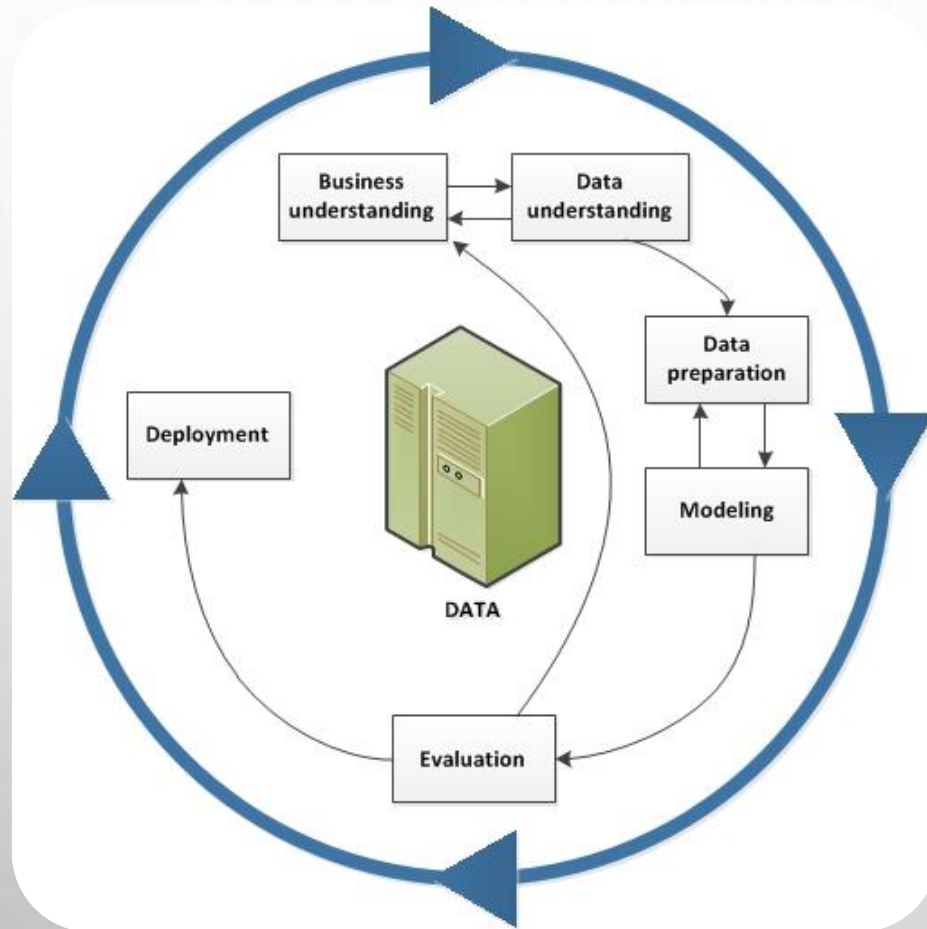
DIEGO RODRIGUES DSC

INFNET

| Bloco                | Matéria  | Calendário | Avaliação         |
|----------------------|--|------------|-------------------|
| Treinamento Clássico | Introdução   | 06/10      |                   |
|                      | Classificação  | 08, *13    |                   |
|                      | Regressão  | 27, *29    |                   |
|                      | Agrupamento  | 03/11, *05 |                   |
|                      | Séries Temporais  | 10, *12    | <Modelo Clássico> |
| Redes Profundas      | Deep Feed Forward  | 17, *19    |                   |
|                      | Visão Computacional  | 24, *26    |                   |
|                      | Autoencoders   | 01/12, *03 | <Modelo Profundo> |
| Treinamento Moderno  | Transfer Learning  | 08, *10    |                   |
|                      | Sequências   | 15, *17    | <Modelo Avançado> |
|                      | Modelos Generativos  | <COMBINAR> |                   |

The background is a light gray gradient. In the top-left and bottom-right corners, there are several realistic water droplets of various sizes, some overlapping. A faint, circular, textured watermark is visible in the upper center of the page.

# PARTE 1 : TEORIA

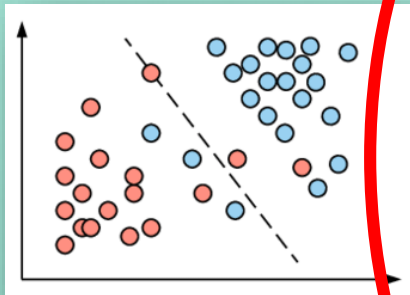


# CROSS INDUSTRY PROCESS FOR DATA MINING (CRISP-DM)

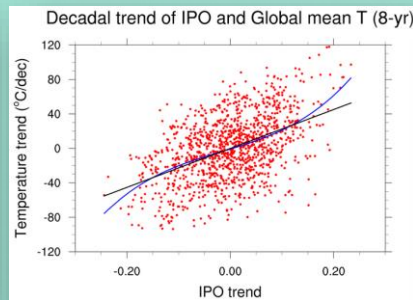
The image features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are clusters of realistic water droplets of various sizes, some overlapping. A faint, circular, embossed-like pattern is visible in the upper center of the page.

# **BUSINESS UNDERSTANDING**

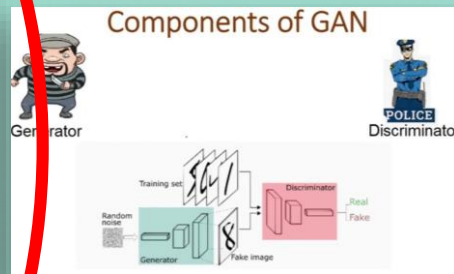
## APRENDIZADO SUPERVISIONADO



CLASSIFICAÇÃO

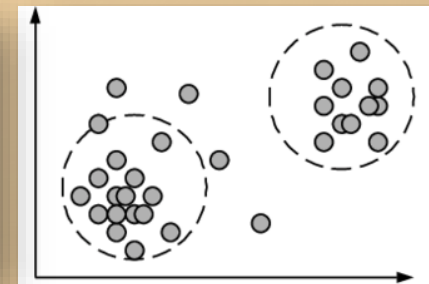


REGRESSÃO



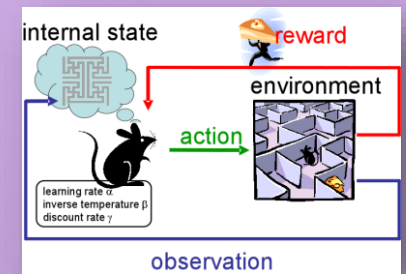
GENERATIVO

## APRENDIZADO NÃO- SUPERVISIONADO



AGRUPAMENTO

## APRENDIZADO POR REFORÇO

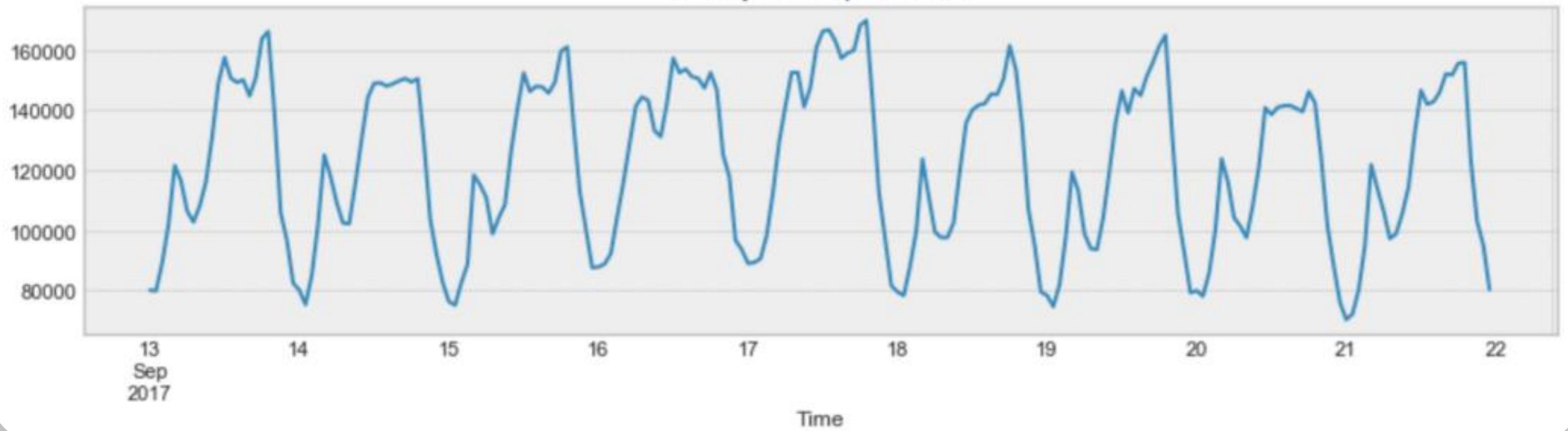


REFORÇO



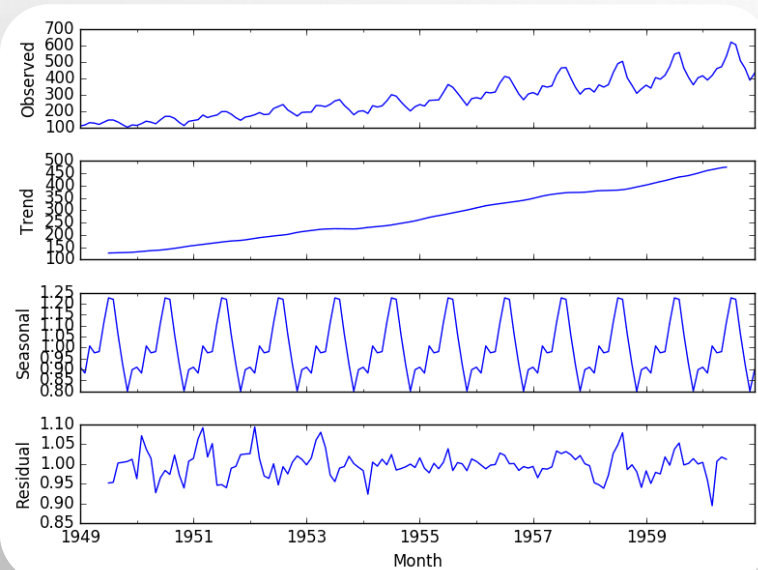
# SÉRIES TEMPORAIS

Time Series Analysis Plots  
Dickey-Fuller:  $p=0.00000$

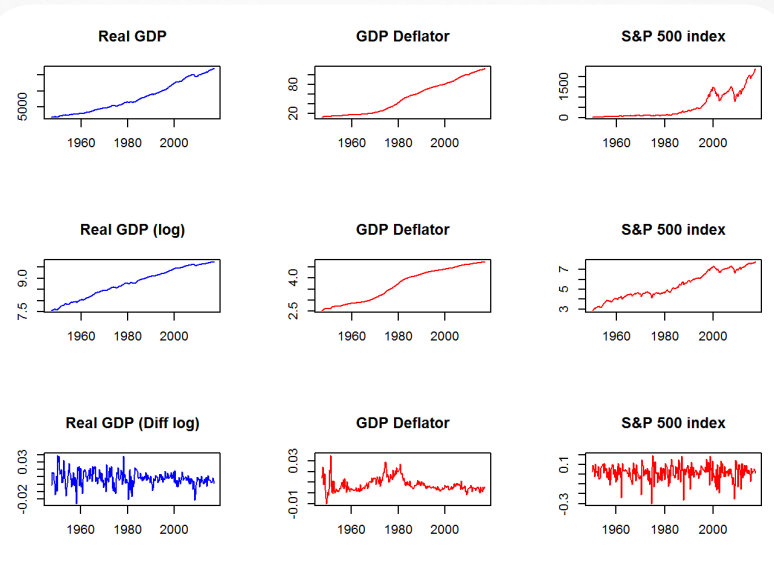


# ABORDAGENS

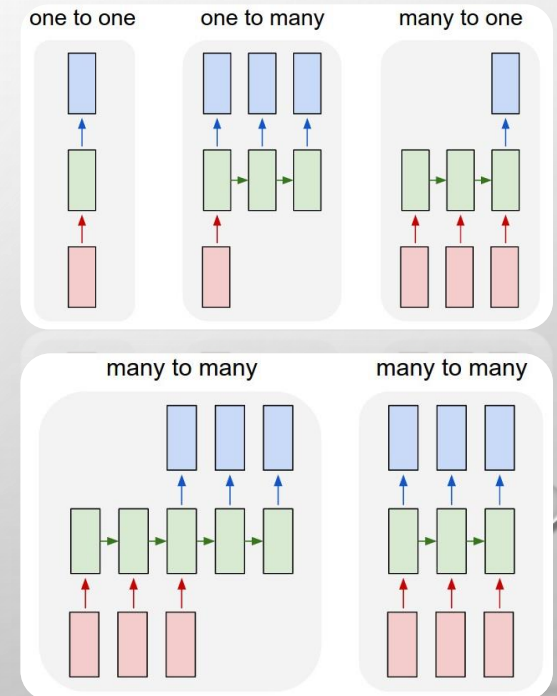
## Decomposição



## Regressão auto-vetor



## Rede Neural Recorrente



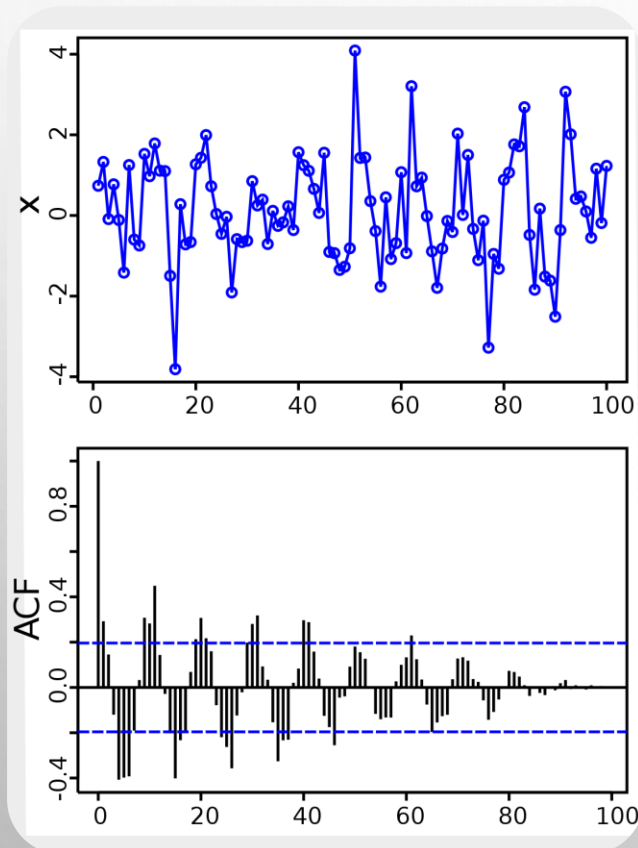


The slide features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are clusters of realistic water droplets of various sizes, rendered with soft shadows and highlights. Faintly visible in the upper center is a circular logo, which appears to be the United Nations emblem, surrounded by a circular arrangement of text.

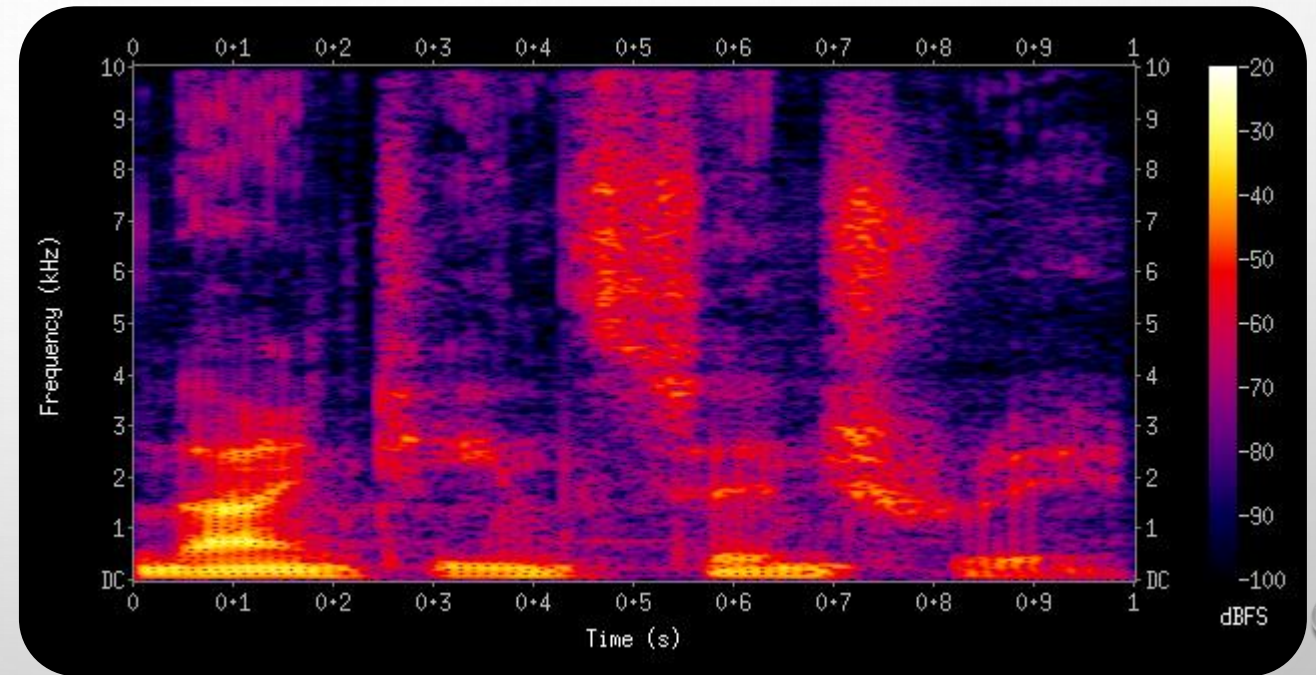
# DATA PREPARATION & UNDERSTANDING

# ANÁLISE EXPLORATÓRIA

## Auto-correlação

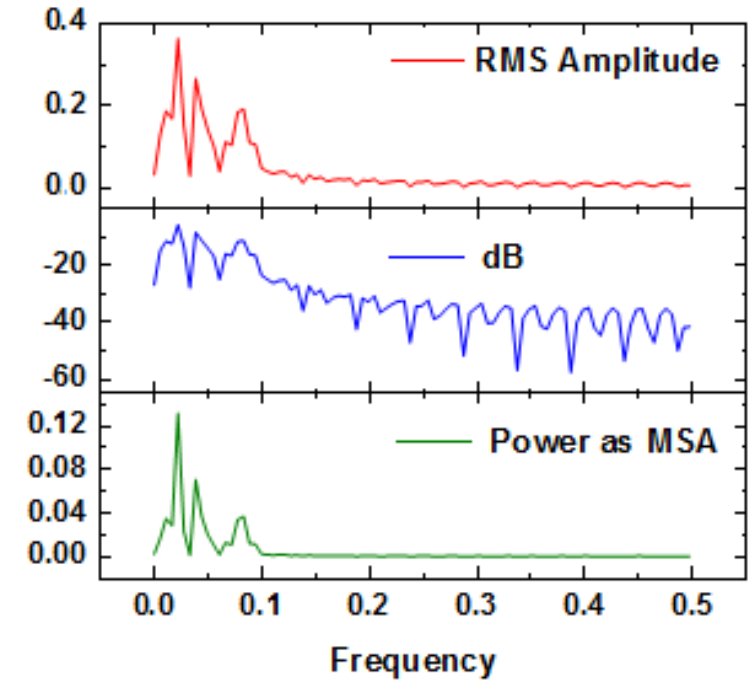
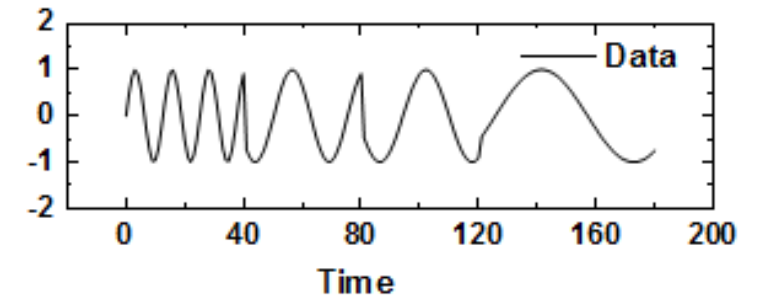
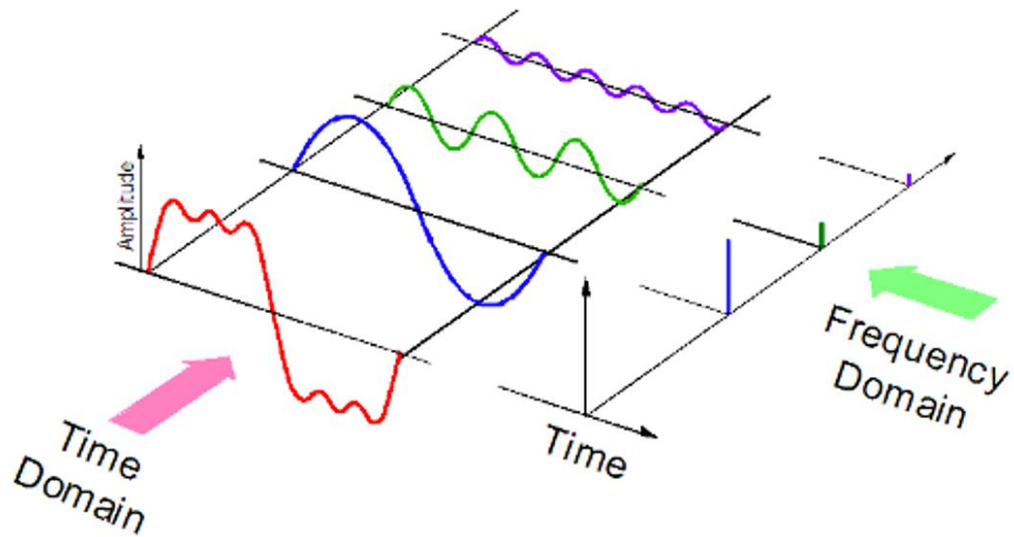


## Espectrograma



# FEATURE EXTRACTION

## Transformada de Fourier



# MODELING

# SÉRIES TEMPORAIS

$$y_t = T_t + C_t + S_t + I_t,$$

$$y_t = T_t \times C_t \times S_t \times I_t.$$

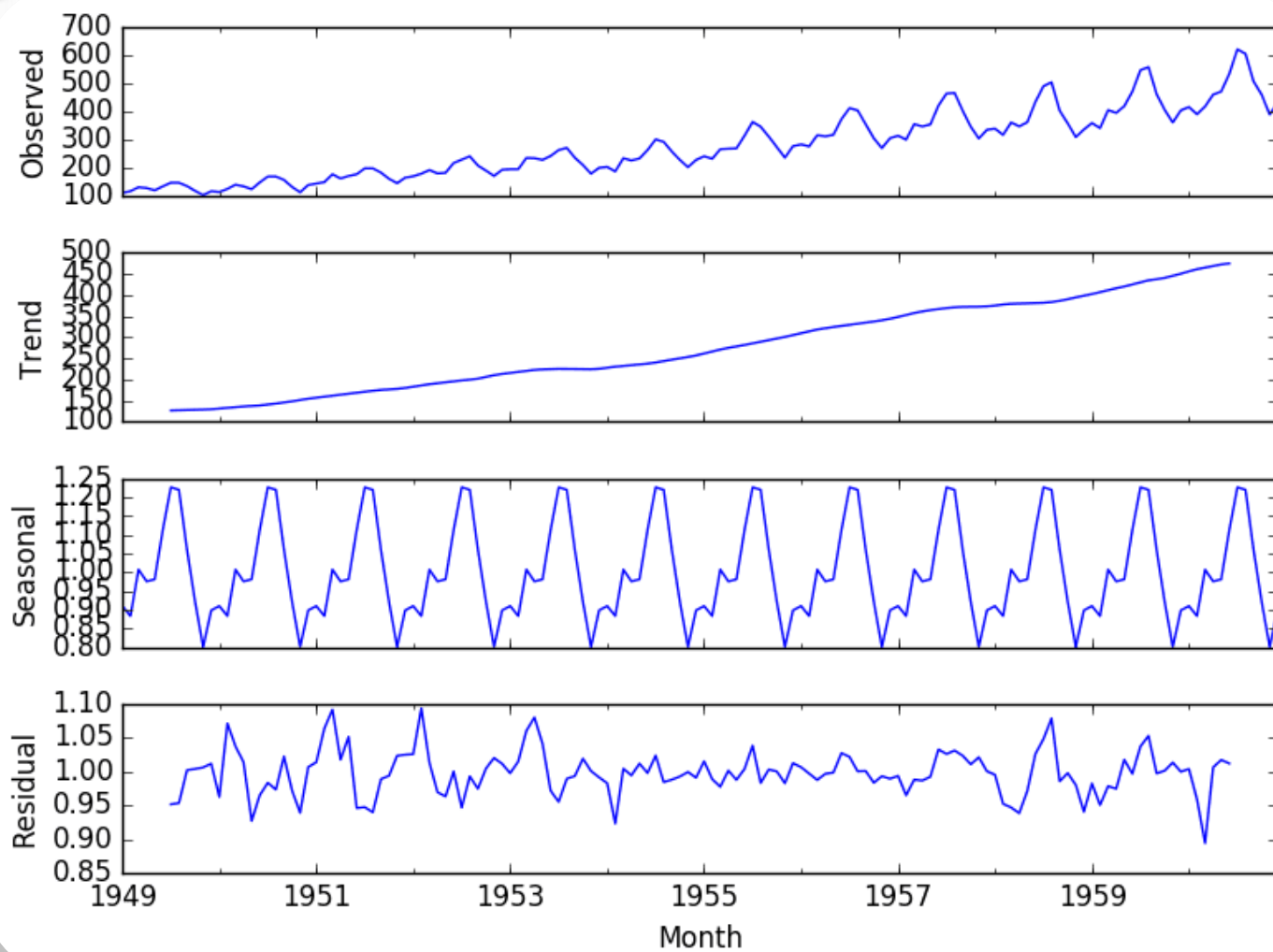
$T_t$  : média / média móvel

$C_t$ : Fourier Passa Baixas / Média Móvel

$S_t$ : Fourier Passa Altas / Picos Remanescentes

$I_t$ : auto-regressão / rede neural





# DECOMPOSIÇÃO

# REGRESSÃO AUTO-VETOR

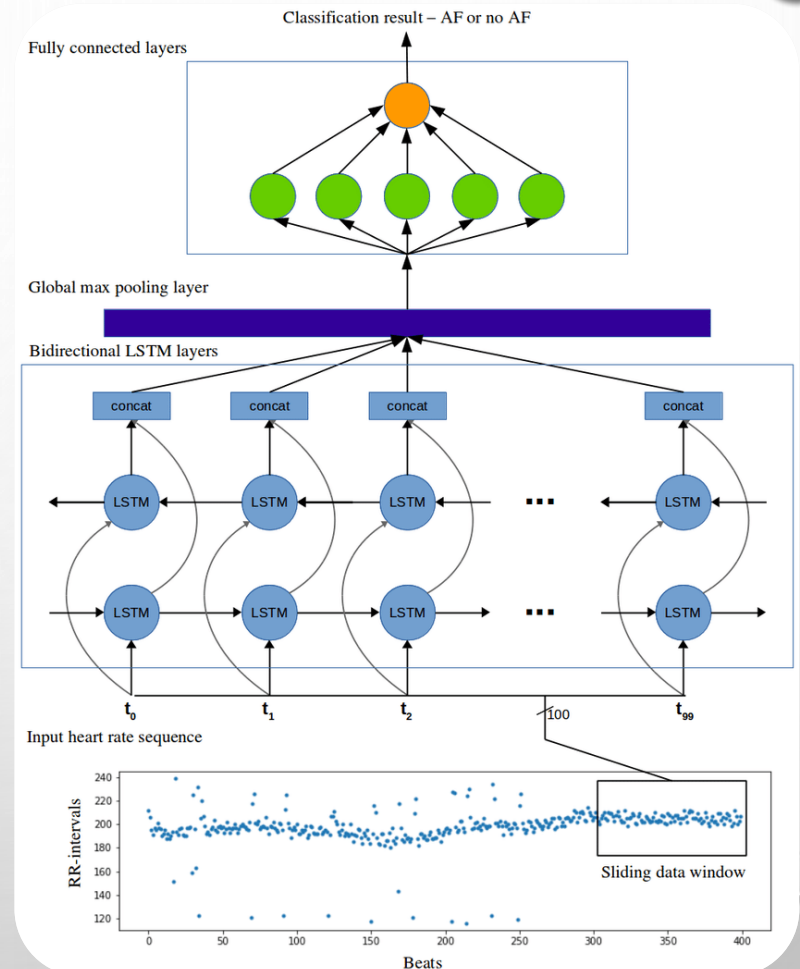
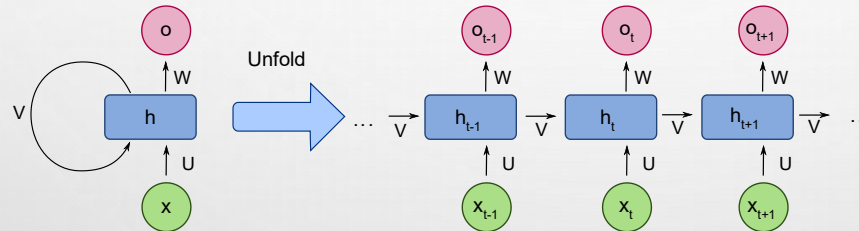
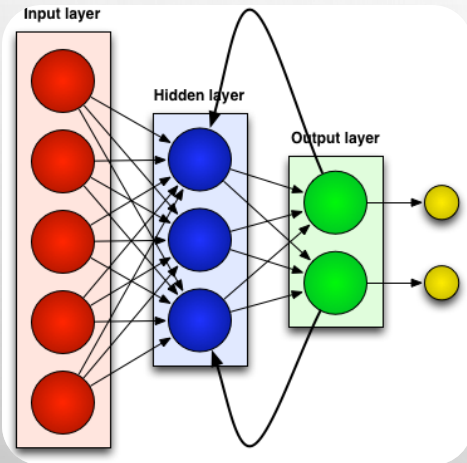
Univariada

$$X_t = c + \sum_{i=1}^p \varphi_i X_{t-i} + \varepsilon_t$$

Multivariada

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + e_t,$$

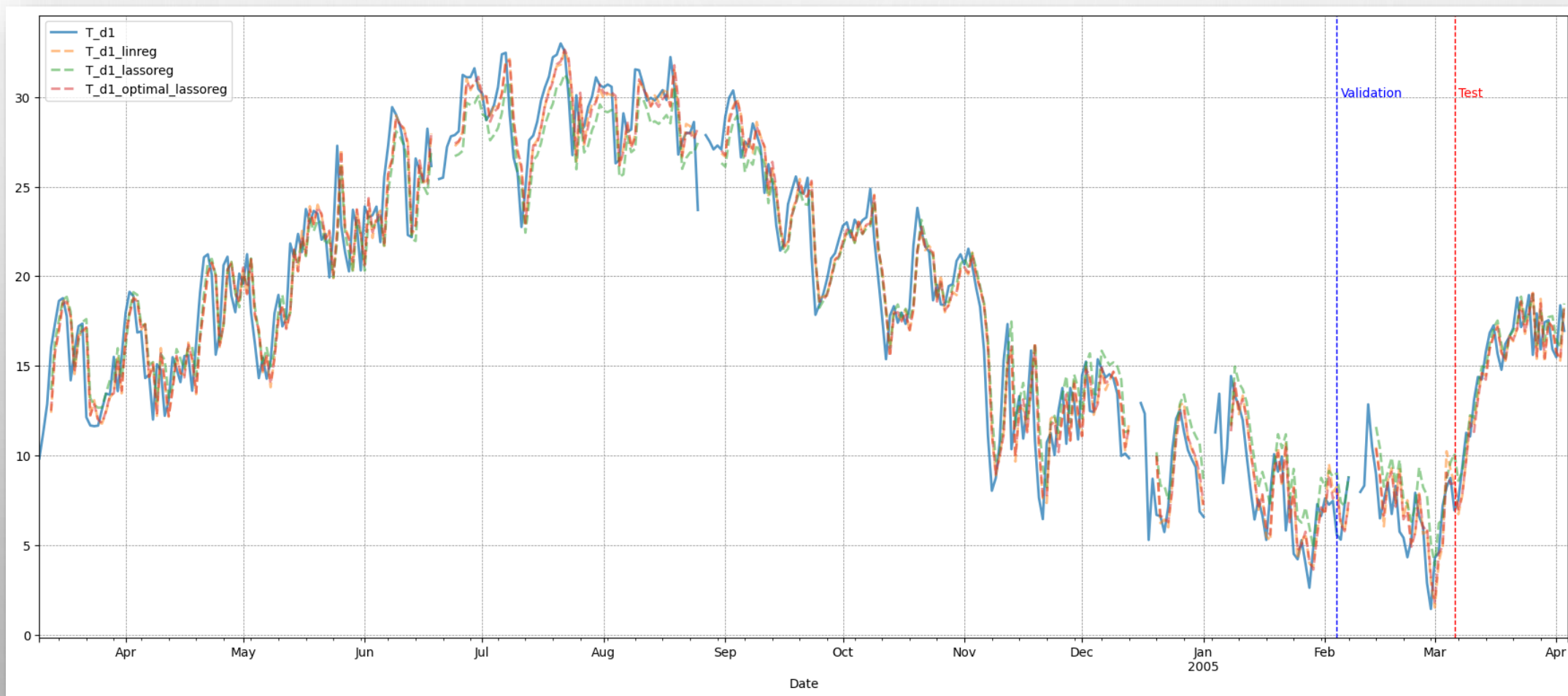
# REDE NEURAL RECORRENTE





# VALIDATION

# SPLIT TREINO TESTE VALIDAÇÃO





The background is a light gray gradient. In the top-left and bottom-right corners, there are several realistic water droplets of various sizes, some overlapping. A faint, circular watermark is visible in the upper center of the page.

## PARTE 2 : PRÁTICA

# AMBIENTE PYTHON



4. Variáveis  
Aleatórias



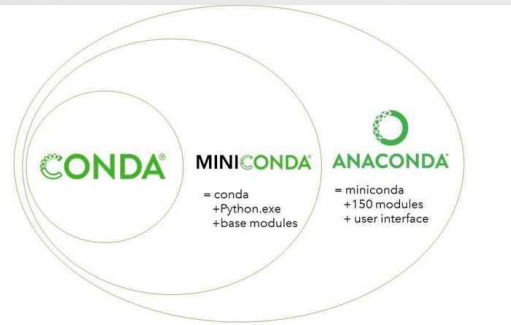
1. Editor de Código



5. Visualização



6. Machine  
Learning



2. Gestor de Ambiente



3. Ambiente  
Python do Projeto



3. Notebook  
Dinâmico

PROBLEMA DE  
NEGÓCIO

AirQuality Temperature

# MODELAGEM

- **REDE NEURAL COM LAGS (AUTO-REGRESSÃO)**
  - 2 LAGS -> DIA SEGUINTE
  - 1 CAMADA OCULTA TANH
  - TREINAMENTO: (T/V/T)
    - MSE

The slide features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are clusters of realistic water droplets of various sizes, rendered with soft shadows and highlights. Faint, circular, concentric patterns are visible in the background, centered behind the text.

# PRÓXIMA AULA: AIR QUALITY REGRESSÃO REDE NEURAL