# 19XX-20XX Text and Speech Recognition Technologies



## **OCR** Character Recognition

The procedure of converting handwritten or typewritten text in digital images into editable and searchable data (Chaudhuri et al., 2016; Sarika et al., 2021).

## **Applications** (Chaudhuri et al., 2016; Sarika et al., 2021)

- Assistance for the visually  $\bigcirc$ impaired
- Automated license plate recognition
- Automated M cartography
- Language translation
- Banking applications Document
- digitization

#### Challenges

Difficulty achieving high correct recognition due to

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- Q complex scenes, varying lighting conditions, (II
- skewness and rotation,

blurring and degradation,

diverse fonts and styles,

multilingual settings, 3 and damaged

documents (Awel & Abidi, 2019). 27

#### Educational Implications

- Text digitalization
- Accessibility and inclusivity
- Document administration
- Automated grading
- . Language learning

## **History** (Chaudhuri et al., 2016; OCRology, 2021)

Mid-1940s • The inception of the first character recognizer



Mid-1950s OCR machines became commercially available

1960-1965 First generation of OCR systems





Mid-1970s Third generation of OCR systems

Till 1986 A few thousand OCR machines were sold

### During the 1990s -

Substantial progress in OCR substantial progress in OC systems occurred, empowered by the continuous growth of information technologies



Nowadavs The advancement of OCR systems continues with more powerful technologies





vocabularv

HMM technology made a breakthrough in Large Vocabulary Continuous Speech Recognition (LVCSR)



During the 1990s & early 2000s The HMM-GMM framework dominated the field of speech recognition

More recently Deep learning techniques brought remarkable improvements. In 2011

New framework (CD)-DNN-HMM achieved significant performance qains

## ASR Automatic Speech Recognition

A technology that converts spoken language into written text. The goal of ASR is "for a computer to be capable to perceive speech, recognize, and take action upon spoken words" (Vadwala et al., 2017, p.31).

## **History** (Wang et al., 2019)

In 1952 The first truly complete speech recognizer

During the 1950s Speech recognition systems were limited to recognizing single words or vowel

During the 1960s Specialized hardware was constructed by Japanese laboratories for speech recognition tasks



Around the 1970s Rapid evolution of speech recognition for speaker-specific tasks with isolated words and small

Mid-1980s

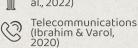






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## **Applications** Voice command systems (Vadwala et al., 2017) P **Dictation systems** Accessibility services (Fendji et al., 2022)



Transcription services (Ibrahim & Varol, 2020)

Language learning

## Challenges

To attain optimal precision, proficient speech recognition systems need to address challenges associated with

- vocabulary.
- channel variability,
- diverse utterance approaches,
- diverse utterabce styles,
- and speaker models (Vadwala et al., 2017).

#### Educational Implications

