Cognate

-Easy as 1,2,T

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Overview

- An application
- A neurocognitive screening test
- Various types of dementia
- Different Languages

Every

3 Seconds

Someone develops Dementia

Worldwide

*World Alzheimer Report 2018, Alzheimer's Disease International


$1 trillion
Global Societal Cost in 2018
*World Alzheimer Report 2018, Alzheimer's Disease International

Why: Impact

- Impact 50 million people worldwide; 10 million new cases every year
- Low cost
  - Treatment gap due to socioeconomic status
  - One study: almost 90% in India unidentified[1]
- Early detection and Education
  - Symptoms: as early as 25-29 years old[2]
  - Delay and Reduce

[1] World Alzheimer Report 2015, Alzheimer's Disease International [2] Epidemiology of Early Onset Dementia: A review of the Literature, Renata et. al

How: Technical Details of Cognate

- The 7 Minute Screen (Solomon et al)
- Sensitivity
  - Alzheimer's: 92.9%
  - Other types of dementia: 89.4%

COGNATE

TEST

TRACK

TRAIN

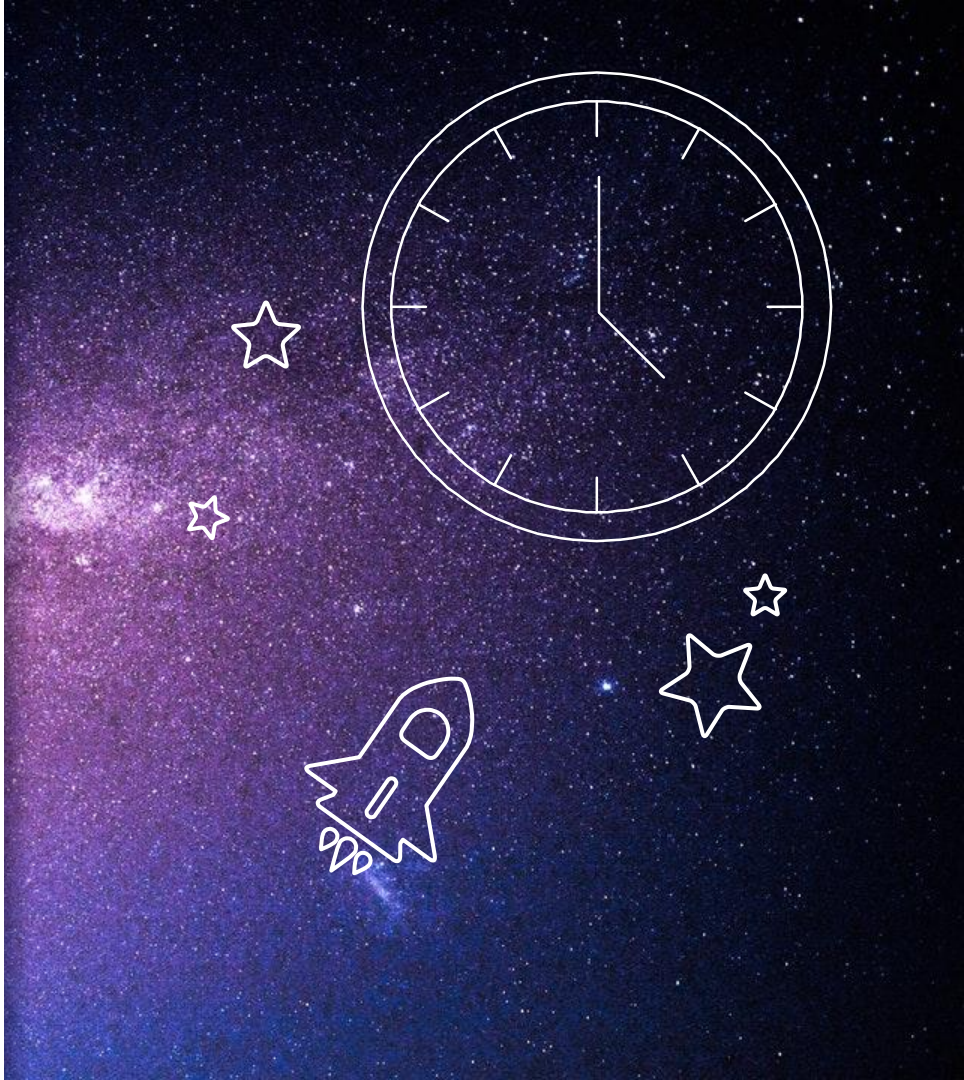
TEST

- The 7 Minute Screen *(*BMJ, *Solomon et al)*

  1. ECR: Enhanced cued recall
  2. BTO: Benton temporal orientation
  3. VF: Verbal Fluency
  4. CD: Clock Drawing

Cloud-based AI Prediction

To effectively predict results of Clock-Drawing Test



Cloud-Based Machine Learning Prototype

- Google Cloud AutoML Vision - Cloud Based Processing, Efficient given Hackathon time-constraints
- Developed with 235 Clock Drawing images scraped from Research Papers and Documents
- 3 labels
  - Normal
  - Subnormal
  - Abnormal

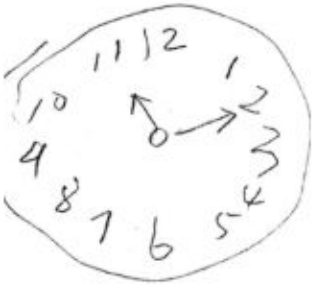
Label: Normal

Normal

Normal

Normal

Normal



Normal

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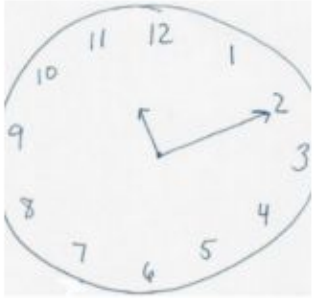
Normal



Normal

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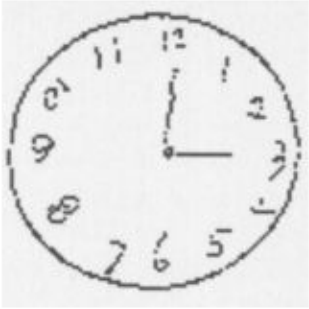
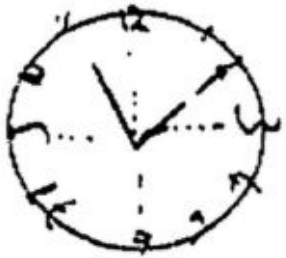
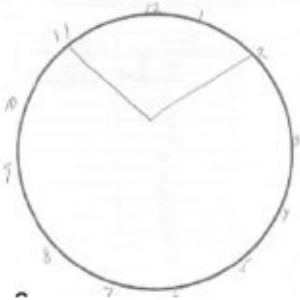


Normal

Label: Subnormal


Subnormal


Subnormal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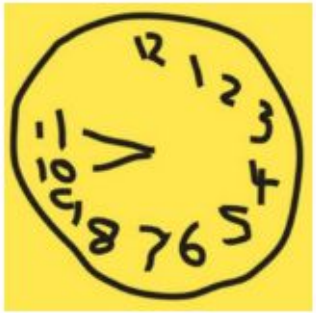
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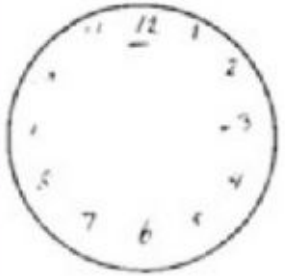
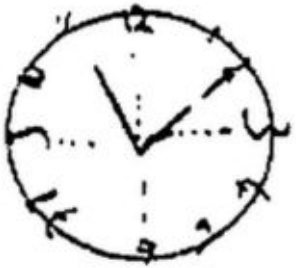

Subnormal


Subnormal

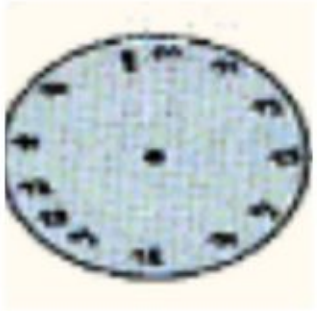

Subnormal


Subnormal

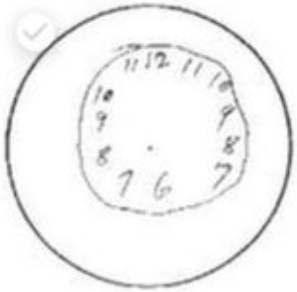

Subnormal


Subnormal

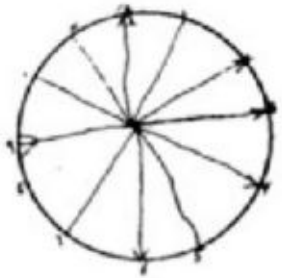
Label: Abnormal



Abnormal



Abnormal

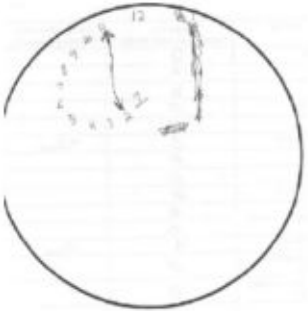


Abnormal

Abnormal

Abnormal

Abnormal



Abnormal

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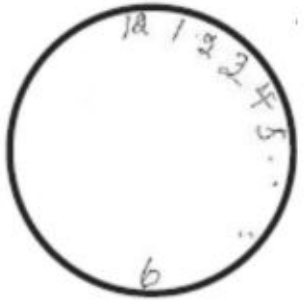

Abnormal

Confusion matrix

This table shows how often the model classified each label correctly (in blue), and which labels were most often confused for that label (in orange).

True label \ Predicted label	Subnormal	Normal	Abnormal
Subnormal	33.3%	55.6%	11.1%
Normal	-	100.0%	-
Abnormal	14.3%	14.3%	71.4%

Preliminary Training

Predictions

Only top 3 labels are shown.

Abnormal	0.992
Subnormal	0.007
Normal	0.000

Predictions

Only top 3 labels are shown.

Subnormal	0.850
Normal	0.124
Abnormal	0.026

Predictions

Only top 3 labels are shown.

Normal	0.836
Subnormal	0.120
Abnormal	0.044

Credits

- “Earlier Diagnosis.” *Alzheimer's Disease and Dementia*, https://www.alz.org/alzheimers-dementia/research_progress/earlier-diagnosis.

- Meulen, J, et al. “The Seven Minute Screen: a Neurocognitive Screening Test Highly Sensitive to Various Types of Dementia.” *Journal of Neurology, Neurosurgery & Psychiatry*, BMJ Publishing Group Ltd, 1 May 2004, https://jnnp.bmj.com/content/75/5/700.

- “What Are the Signs of Alzheimer's Disease?” *National Institute on Aging*, U.S. Department of Health and Human Services, https://www.nia.nih.gov/health/what-are-signs-alzheimers-disease.

Thank you!