

## Global Training Of Neural Networks For Phenomic Classification

Tech ID: 28977 / UC Case 2016-168-0

### SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a high-throughput, label-free cell classification method based on time-stretch quantitative phase imaging.

### BACKGROUND

Label-free cell analysis is essential to personalized genomics, cancer diagnostics, and drug development as it avoids adverse effects of staining reagents on cellular viability and cell signaling. However, currently available label-free cell assays mostly rely only on a single feature and lack sufficient differentiation. Also, the sample size analyzed by these assays is limited due to their low throughput.

### INNOVATION

UCLA researchers integrate feature extraction and deep learning with high-throughput quantitative imaging enabled by photonic time stretch, achieving record high accuracy in label-free cell classification. The system captures quantitative optical phase and intensity images and extracts multiple biophysical features of individual cells. These biophysical measurements form a hyperdimensional feature space in which supervised learning is performed for cell classification. This system opens up a new path to data-driven phenotypic diagnosis and better understanding of the heterogeneous gene expressions in cells.

### APPLICATIONS

- ▶ Cell screening and classification
- ▶ Medical, biotechnological and research application

### ADVANTAGES

- ▶ Label free
- ▶ High throughput
- ▶ High resolution
- ▶ High accuracy

### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,593,039	03/17/2020	2016-168

### RELATED MATERIALS

- ▶ Chen, C. L., Mahjoubfar, A., Tai, L. C., Blaby, I. K., Huang, A., Niazi, K. R., & Jalali, B. (2016). Deep learning in label-free cell classification. Scientific reports, 6, 21471.

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Phase Transform For Object And Shape Detection In Digital Images](#)
- ▶ [Apparatus And Method For Optically Amplified Multi-Dimensional Spectrally Encoded Imaging](#)
- ▶ [Apparatus And Method For Multiple-Pulse Impulsive Stimulated Raman Spectroscopy](#)

### CONTACT

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### INVENTORS

- ▶ Jalali, Bahram

### OTHER INFORMATION

#### KEYWORDS

Deep learning, high-throughput, cell analysis, classification, label-free, time-stretch, imaging

#### CATEGORIZED AS

- ▶ **Biotechnology**
  - ▶ Bioinformatics
  - ▶ Genomics
- ▶ **Medical**
  - ▶ Imaging
  - ▶ Screening
- ▶ **Research Tools**
  - ▶ Bioinformatics

#### RELATED CASES

2016-168-0

- ▶ [Ultrafast Differential Interference Contrast Microscopy](#)
- ▶ [A Single-Shot Network Analysis Method For The Characterization Of Opto-Electronic And Electrical Devices And Systems](#)
- ▶ [Apparatus and Signal Processing Technique for Real-Time Label-Free High-Throughput Cell Screening](#)

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