# BITS :: Call for Abstracts 2021 - Oral communication

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| *Type* | Oral communication |
| *Session* | Multiomics and Single Cell Analysis |
| *Title* | Sparsely Connected Autoencoders (SCA) as multi-purpose tool for single-cell RNAseq data mining. |
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*Motivation*

Single-cell RNA sequencing (scRNAseq) is an essential tool to investigate cellular heterogeneity. Thus, it would be of great interest being able to disclose biological information belonging to cell subpopulations, which can be defined by clustering analysis of scRNAseq data. Network analysis is a crucial tool to uncover biological and pathological mechanisms, and it is becoming an area of research for the single cell bioinformatics community. Within this field neural networks and in particular autoencoders seem to be particularly suitable for the analysis of single cell data.

*Methods*

We have recently developed a particular type of autoencoder, which is characterized by a sparsely connected architecture (SCA), meaning that each node of the hidden layer is connected to only part of the input/output nodes. We have recently published a paper in which we show that SCA are able to reconstruct single cell clusters only using hidden layer describing biological information, like transcription factors and miRNA.

*Results*

Here we would like to introduce the use of SCA as a multipurpose tool for single cell data mining. Specifically, we extended the ability of SCA to recognize cell sub-populations on the basis of hidden layers made of transcription factors and miRNA, which are linked to each other by the presence of internal regulatory circuits. Furthermore, we have used SCA to reconstruct pseudo-bulk experiments from single-cell clusters. These SCA allow the construction of virtual multi-sample experiments, which not being zero-inflated, provide an easier detection of the cluster-specific signatures. We have also used SCA as tool to integrate scRNA-seq and scATAC-seq. In this specific setting, the SCA allows the identification of functional genomic regions controlling cell-population specific cell expression

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| *Info* | |
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| *Figure* | |
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| *Availability* | - |

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