CSV Handler

> *Author : csl*

> *E-Mail : 3079625093@qq.com*

1. OverView

This is a library implemented with cpp macros to read and write CSV files. It is simple and universal.

```
 _|_|_|    _|_|_|  _|      _|  _|    _|                          _|  _|
_|        _|        _|      _|  _|    _|    _|_|_|  _|_|_|      _|_|_|  _|    _|_|    _|
_|_|
_|          _|_|    _|      _|  _|_|_|_|  _|    _|  _|    _|  _|    _|  _|  _|_|_|_|  _|_|
_|              _|    _|  _|    _|    _|  _|    _|  _|    _|  _|    _|  _|  _|        _|
  _|_|_|  _|_|_|        _|      _|    _|    _|_|_|  _|    _|    _|_|_|  _|    _|_|_|  _|
```

2. Test Data Files

2.1 info.csv

The following CSV file is incomplete, but does not affect data reading.

```
201901,Tom,81.1
201902,Jhon,
201903,Jer ry,95.3
201904,,95.6
201905,Mary,81.1
201906,Lily,95.6
201907,Lina,95.3
201908,Jack,81.1
201909,Bob,81.1
201910,St ack,95.3
```

- example 1: read all data
  - code

```cpp
struct Info {
  int _id;
  std::string _name;
  float _score;
};

void test_READ_FILE_ALL() {
  ns_log::info("'test_READ_FILE_ALL'-'../data/info.csv'");
  auto data = ns_csv::CSVReader::read<CSV_STRUCT(Info, _id, _name, _score)>
("../data/info.csv", ',');
  vecOutput(data);
}
```

- result

```
[info]-[1653792605.095598(S)] 'test_READ_FILE_ALL'-'../data/info.csv'
{'id': 201901, 'name': Tom, 'score': 81.1}
{'id': 201902, 'name': Jhon, 'score': 0}
{'id': 201903, 'name': Jer ry, 'score': 95.3}
{'id': 201904, 'name': , 'score': 95.6}
{'id': 201905, 'name': Mary, 'score': 81.1}
{'id': 201906, 'name': Lily, 'score': 95.6}
{'id': 201907, 'name': Lina, 'score': 95.3}
{'id': 201908, 'name': Jack, 'score': 81.1}
{'id': 201909, 'name': Bob, 'score': 81.1}
{'id': 201910, 'name': St ack, 'score': 95.3}
```

- example 2: read some data
  - code

```cpp
struct Info {
  int _id;
  std::string _name;
  float _score;
};

void test_READ_IFS_CER() {
  ns_log::info("'test_READ_IFS_CER'-'../data/info.csv'");
  std::ifstream ifs("../data/info.csv");
  auto data = ns_csv::CSVReader::read<CSV_STRUCT(Info, _id, _name, _score)>(ifs,
',', 4);
  vecOutput(data);
  ifs.close();
}
```

  - result

```
[info]-[1653792605.095390(S)] 'test_READ_IFS_CER'-'../data/info.csv'
{'id': 201901, 'name': Tom, 'score': 81.1}
{'id': 201902, 'name': Jhon, 'score': 0}
{'id': 201903, 'name': Jer ry, 'score': 95.3}
{'id': 201904, 'name': , 'score': 95.6}
```

2.2 refpoint3f_h.csv

A complete CSV file with header description information.

```
id,x,y,z
9,0.0605643,0.897656,0.166507
8,0.274907,0.477732,0.436411
7,0.884707,0.0726859,0.753356
6,0.98255,0.365339,0.75641
5,0.328234,0.0474645,0.762198
4,0.701191,0.653919,0.526929
3,0.930436,0.686773,0.0668422
2,0.00769819,0.5297,0.0345721
1,0.519416,0.934693,0.678865
0,0.218959,0.45865,0.131538
```

example: read

- code

```
struct RefPoint3f {
  std::size_t _id;
  float _x;
  float _y;
  float _z;
};

void test_READ_FILE_ALL_H() {
  ns_log::info("'test_READ_FILE_ALL_H'-'../data/refpoint3f_h.csv'");
  auto data = ns_csv::CSVReader::readWithHeader<CSV_STRUCT(RefPoint3f, _id, _x, _y,
_z)>("../data/refpoint3f_h.csv", ',');
  ns_log::info("header: ", data.first.at(0), ',', data.first.at(1), ',',
               data.first.at(2), ',', data.first.at(3));
  vecOutput(data.second);
}
```

- result

```
[info]-[1653792605.095761(S)] 'test_READ_FILE_ALL_H'-'../data/refpoint3f_h.csv'
[info]-[1653792605.095891(S)] header: id,x,y,z
{'id': 9, 'x': 0.0605643, 'y': 0.897656, 'z': 0.166507}
{'id': 8, 'x': 0.274907, 'y': 0.477732, 'z': 0.436411}
{'id': 7, 'x': 0.884707, 'y': 0.0726859, 'z': 0.753356}
{'id': 6, 'x': 0.98255, 'y': 0.365339, 'z': 0.75641}
{'id': 5, 'x': 0.328234, 'y': 0.0474645, 'z': 0.762198}
{'id': 4, 'x': 0.701191, 'y': 0.653919, 'z': 0.526929}
{'id': 3, 'x': 0.930436, 'y': 0.686773, 'z': 0.0668422}
{'id': 2, 'x': 0.00769819, 'y': 0.5297, 'z': 0.0345721}
{'id': 1, 'x': 0.519416, 'y': 0.934693, 'z': 0.678865}
{'id': 0, 'x': 0.218959, 'y': 0.45865, 'z': 0.131538}
```

3. Methods

3.1 Read CSV file

3.1.1 static methods

```
/**
 * @brief read all items in the ifstream
 *
 * @param ifs the input fstream
 * @param splitor the splitor
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static std::vector<StructType> read(std::ifstream &ifs, char splitor);
```

```
/**
 * @brief read all items in the ifstream with header
 *
 * @param ifs the input fstream
 * @param splitor the splitor
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static auto readWithHeader(std::ifstream &ifs, char splitor);
```

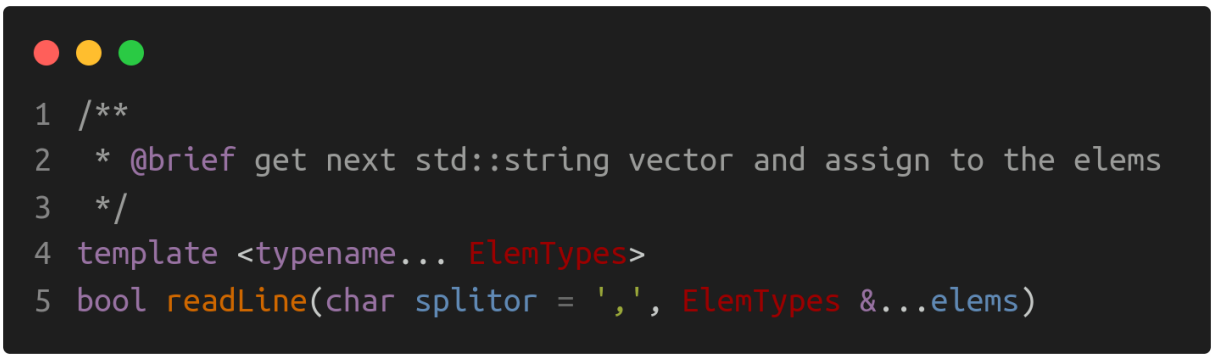
```
/**
 * @brief read some items in the ifstream
 *
 * @param ifs the input fstream
 * @param splitor the splitor
 * @param itemNum the number of the items to read
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static std::vector<StructType> read(std::ifstream &ifs, char splitor, std::size_t itemNum);
```

```
/**
 * @brief read some items in the ifstream with header
 *
 * @param ifs the input fstream
 * @param splitor the splitor
 * @param itemNum the number of the items to read
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static auto readWithHeader(std::ifstream &ifs, char splitor, std::size_t itemNum);
```

```
/**
 * @brief read all items in the file
 *
 * @param fileName the file name
 * @param splitor the splitor
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static std::vector<StructType> read(const std::string &fileName, char splitor);
```

```
/**
 * @brief read all items in the file with header
 *
 * @param fileName the file name
 * @param splitor the splitor
 *
 * @return std::vector<itemType> data
 */
template <typename StructType, typename... MemPacks>
static auto readWithHeader(const std::string &fileName, char splitor);
```

3.1.2 class object



```
/**
 * @brief get next std::string vector and assign to the elems
 */
template <typename... ElemTypes>
bool readLine(char splitor = ',', ElemTypes &...elems)
```

- *CSVReader[IFS]*

```
void test_CSVReader_IFS() {
  ns_log::info("'test_CSVReader_IFS''../data/info.csv'");
  std::ifstream ifs("../data/info.csv");
  ns_csv::CSVReader::Ptr readerIFS = ns_csv::CSVReader::create(ifs);
  Info i{};
  while (readerIFS->readLine(',', i._id, i._name, i._score)) {
    std::cout << i << std::endl;
  }
  ifs.close();
}
```

- *CSVReader[FILE]*

```
void test_CSVReader_FILE() {
  ns_log::info("'test_CSVReader_FILE'-'../data/info.csv'");
  ns_csv::CSVReader::Ptr reader = ns_csv::CSVReader::create("../data/info.csv");
  Info i{};
  while (reader->readLine(',', i._id, i._name, i._score)) {
    std::cout << i << std::endl;
  }
}
```

3.2 Write CSV file

3.2.1 static methods

```cpp
/**
 * @brief write data to a csv file
 *
 * @param ofs the out fstream
 * @param splitor the splitor
 * @param data the data array
 */
template <typename StructType, typename... MemPacks>
static void write(std::ofstream &ofs, char splitor, const std::vector<StructType> &data) ;
```

```cpp
/**
 * @brief write data to a csv file
 *
 * @param ofs the out fstream
 * @param splitor the splitor
 * @param header the header labels
 * @param data the data array
 */
template <typename StructType, typename... MemPacks>
static void writeWithHeader(std::ofstream &ofs, char splitor,
                            const std::array<std::string, sizeof...(MemPacks)> &header,
                            const std::vector<StructType> &data);
```

```cpp
/**
 * @brief write data to a csv file
 *
 * @param fileName the file name
 * @param splitor the splitor
 * @param data the data array
 */
template <typename StructType, typename... MemPacks>
static void write(const std::string &fileName, char splitor, const std::vector<StructType>
&data);
```

```cpp
/**
 * @brief write data to a csv file with header
 *
 * @param fileName the file name
 * @param splitor the splitor
 * @param header the header labels
 * @param data the data array
 */
template <typename StructType, typename... MemPacks>
static void writeWithHeader(const std::string &fileName, char splitor,
                            const std::array<std::string, sizeof...(MemPacks)> &header,
                            const std::vector<StructType> &data);
```

3.2.2 class object

```cpp
/**
 * @brief use variable template parameters to write any num arguements
 */
template <typename... Types>
void writeLine(char splitor, const Types &...argvs)
```

- *CSVWriter[OFS]*

```cpp
void test_CSVWriter_OFS() {
  ns_log::info("'test_CSVWriter_OFS'-'../data/refpoint3f_h.csv'");
  std::ofstream ofs("../data/refpoint3f_h.csv");
  ns_csv::CSVWriter::Ptr writer = ns_csv::CSVWriter::create(ofs);
  writer->writeLine(',', "id", "x", "y", "z");
  for (const auto &p : ps)
    writer->writeLine(',', p._id, p._x, p._y, p._z);
  ofs.close();
}
```

- *CSVWriter[FILE]*

```cpp
void test_CSVWriter_FILE() {
  ns_log::info("'test_CSVWriter_FILE'-'../data/refpoint3f_h.csv'");
  ns_csv::CSVWriter::Ptr writer = ns_csv::CSVWriter::create("../data/refpoint3f_h.csv");
  writer->writeLine(',', "id", "x", "y", "z");
  for (const auto &p : ps) {
    writer->writeLine(',', p._id, p._x, p._y, p._z);
  }
}
```